



# DICOM Conformance Statement

**IOLMaster<sup>®</sup> 700**

**Version 1.90**

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## 1 Conformance Statement Overview

The IOLMaster 700 device is a combined biometry instrument for the visualization of eye structures and acquisition of data of the human eye required for the calculation of the intraocular lens to be implanted.

The device is capable of consecutive measurement of the following eye parameters in one session: axial length, corneal curvatures, corneal thickness, anterior chamber depth, lens thickness and WTW distance. All measurements are non-contact, providing excellent patient comfort.

The IOLMaster 700 Application Software consists of one application entity which allows to:

- query modality worklist
- query patients
- archive biometry measurement data
- archive biometry acquisition images
- archive intraocular lens calculation results
- archive evidence reports

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)
<b>Transfer</b>		
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	No
Ophthalmic Photography 8 Bit Image Storage	Yes	No
Keratometry Measurements Storage	Yes	No
Ophthalmic Axial Measurements Storage	Yes	No
Intraocular Lens Calculations Storage	Yes	No
Encapsulated PDF Storage	Yes	No
<b>Workflow Management</b>		
Verification	Yes	Yes
Storage Commitment Push Model SOP Class	Yes	No
Modality Worklist Information Model - FIND	Yes	No
<b>Query / Retrieve</b>		
Patient Root Query/Retrieve Information Model – FIND	Yes	No

The IOLMaster 700 does not support Media Interchange.

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## 3 Introduction

### 3.1 Revision History

Document Version	Date	Author	Changes
I	2020-05-19	Patrick A. Nast	Initial Revision
II	2021-01-13	Patrick A. Nast	New document revision for Software version "1.90.6.54\C87103" Added multiplicity information to Acquisition Context coded terminology Removed Pixel Spacing from OAM Quality Control images Changed PoV for Acquisition Context Sequence (0040,0555) >Value Type (0040,A040) from "ANAP" to "ALWAYS"

### 3.2 Audience

This document is written for the people that need to understand how IOLMaster 700 will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

### 3.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between IOLMaster 700 and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

### 3.4 Definitions and Terms

Informal definitions are provided for the following terms used in this Conformance Statement.

The DICOM Standard is the authoritative source for formal definitions of these terms.

#### Abstract Syntax

The information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class.

Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

#### Application Entity (AE)

An end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

#### Application Entity Title

The externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.

**Application Context**

The specification of the type of communication used between Application Entities.

Example: DICOM network protocol.

**Association**

A network communication channel set up between Application Entities.

**Attribute**

A unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements.

Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

**Information Object Definition (IOD)**

The specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C).

Examples: MR Image IOD, CT Image IOD, Print Job IOD.

**Joint Photographic Experts Group (JPEG)**

A set of standardized image compression techniques, available for use by DICOM applications.

**Media Application Profile**

The specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

**Module**

A set of Attributes within an Information Object Definition that are logically related to each other.

Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

**Negotiation**

First phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.

**Presentation Context**

The set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.

**Protocol Data Unit (PDU)**

A packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

**Query Key**

An input value for a query process. Query Keys denote the set of DICOM tags that are sent from the SCU to SCP and thus control the query result.

**Security Profile**

A set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

**Service Class Provider (SCP)**

Role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User).

Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

**Service Class User (SCU)**

Role of an Application Entity that uses a DICOM network service; typically, a client.

Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

**Service/Object Pair (SOP) Class**

The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification.

Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

**Service/Object Pair (SOP) Instance**

An information object; a specific occurrence of information exchanged in a SOP Class.

Examples: a specific x-ray image.

**Tag**

A 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element.

Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

**Transfer Syntax**

The encoding used for exchange of DICOM information objects and messages.

Examples: JPEG compressed (images), little endian explicit value representation.

**Unique Identifier (UID)**

A globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier.

Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

**Value Representation (VR)**

The format type of an individual DICOM data element, such as text, an integer, a person’s name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

## 3.5 Abbreviations

**Table 3-1 Abbreviations used in this document**

Abbreviation	Definition
ANAP	Attribute is not always present – Applicable for Type 3
AE	Application Entity
AET	Application Entity Title
APP	Application
AUTO	Automatically generated, cannot be modified by the operator
BRQ	Broad Query mode of Modality Worklist Query
CONFIG	Configurable parameter
CZM	Carl Zeiss Meditec
DEF	Default value
DICOM	Digital Imaging and Communications in Medicine
ELE	Explicit Little Endian
ILE	Implicit Little Endian
IM	Information Model
IOD	Information Object Definition
IOL	Intraocular lens – A lens implanted in the eye
JPG-1	JPEG Coding Process 1 transfer syntax; JPEG Baseline; ISO 10918-1
JPG-LL	JPEG Lossless
J2K	JPEG 2000 Image Compression
J2K-LL	JPEG 2000 Image Compression (Lossless Only)
RLE-LL	Run Length Encoding Lossless
MPPS	Modality Performed Procedure Step
MWL	Modality Worklist

MPG2	Motion Picture Expert Group 2; Abbreviation and synonym for video encoding and compression transfer syntax.
MPG2 – ML	MPEG2 Main Profile @ Main Level
MPG2 – HL	MPEG2 Main Profile @ High Level
OD	Oculus Dexter, the right eye
OS	Oculus Sinister, the left eye
OU	Oculus Uterque, both eyes
OP	Ophthalmic Photography
PBQ	Patient Based Query mode of Modality Worklist Query
PL	Pick list
PLD	Pick list item details
PRQ	Patient Root Query
RIS	Radiology Information System
RNG	Range of values
SCP	Service Class Provider
SCU	Service Class User
SEL	Selection from a list of values
SOP	Service Object Pair, union of a specific DICOM service and related IOD.
SRQ	Study Root Query
TCP/IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier
USER	User input
VNAP	Value Not Always Present (attribute sent zero length if no value is present) – Applicable for Type 2, 2C.

## 3.6 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 4.0, 2016 (available free at [http://www.ihe.net/Technical\\_Framework/index.cfm](http://www.ihe.net/Technical_Framework/index.cfm)).



## 4 Networking

### 4.1 Implementation Model

#### 4.1.1 Application Data Flow

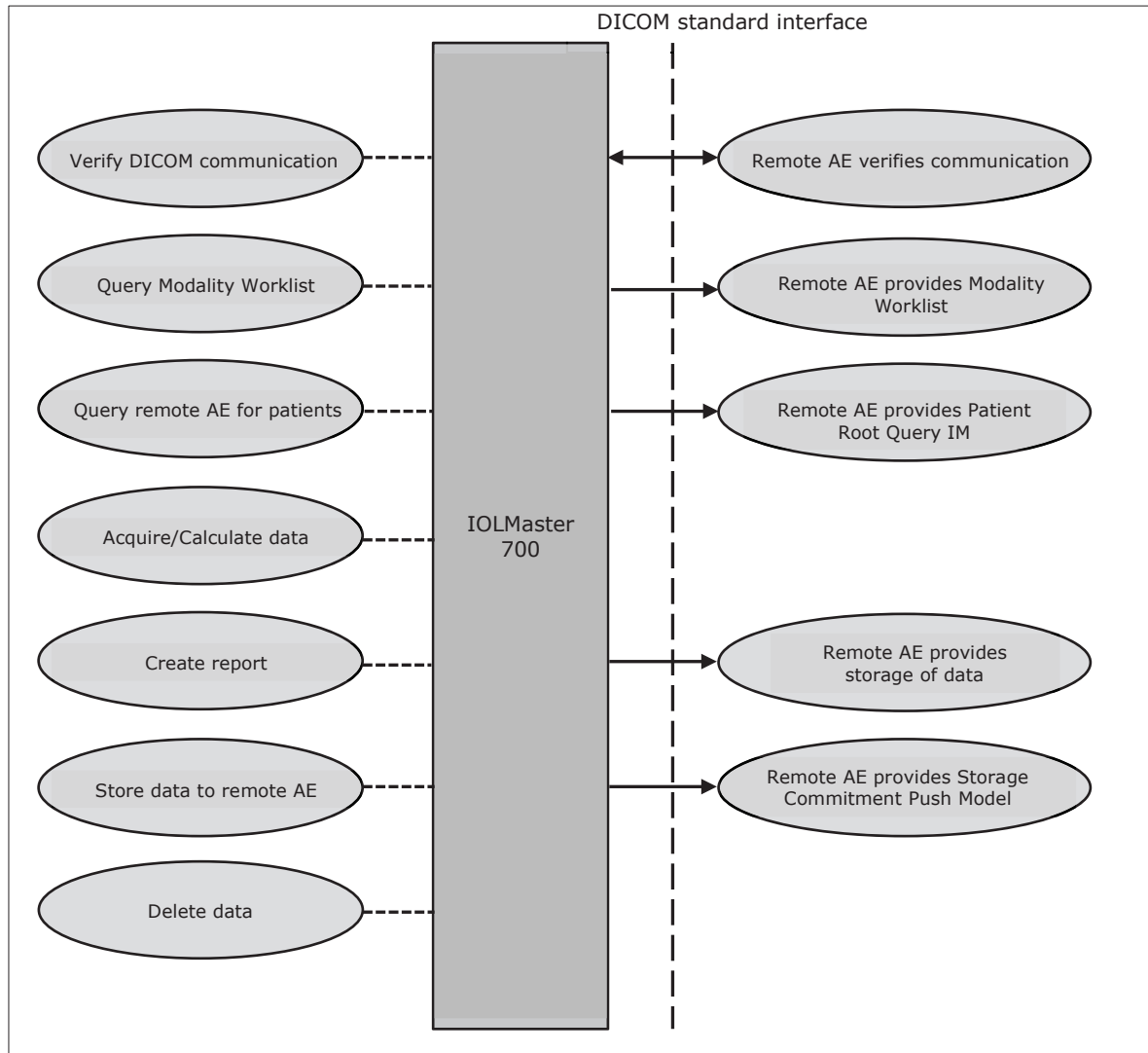


Figure 4-1 IOLMaster 700 Application Software as Acquisition Modality

## 4.1.2 Functional Definition of AEs

### 4.1.2.1 Functional Definition of IOLMaster 700

The IOLMaster 700 device is a combined biometry instrument for the visualization of eye structures and acquisition of data of the human eye required for the calculation of the intraocular lens to be implanted.

The device is capable of consecutive measurement of the following eye parameters in one session: axial length, corneal curvatures, corneal thickness, anterior chamber depth, lens thickness and WTW distance. All measurements are non-contact, providing excellent patient comfort.

The IOLMaster 700 Application Software consists of one application entity which allows to:

- query modality worklist
- query patients
- archive biometry measurement data
- archive biometry acquisition images
- archive intraocular lens calculation results
- archive evidence reports

IOLMaster 700 implements a Service Class User (SCU) for the following DICOM Services:

- Verification
- Modality Worklist Information Model – FIND
- Patient Root Query/Retrieve Information Model – FIND
- Multi-frame Grayscale Byte Secondary Capture Image Storage
- Ophthalmic Photography 8 Bit Image Storage
- Keratometry Measurements Storage
- Ophthalmic Axial Measurements Storage
- Intraocular Lens Calculations Storage
- Encapsulated PDF Storage
- Storage Commitment Push Model

IOLMaster 700 implements a Service Class Provider (SCP) for the following DICOM Services:

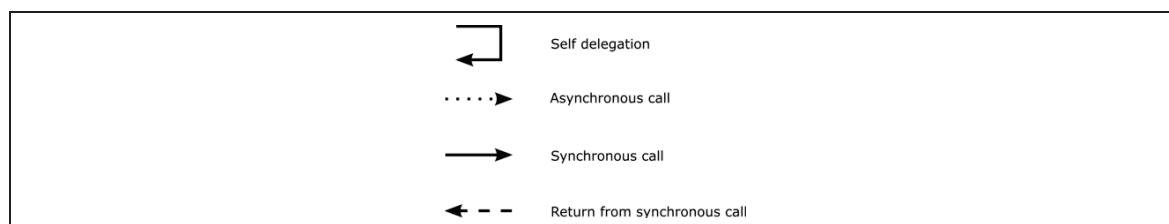
- Verification

All DICOM functionalities have been integrated into the application user interface and will not require any manual invoking of DICOM specific user interface.

The IOLMaster 700 Application Software logs extensive information about the DICOM operations to its log file.

### 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 use 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.

#### 4.1.3.1 IOLMaster 700 Activities

##### Query Modality Worklist

When the patient arrives at the IOLMaster 700, the operator queries the worklist. The operator can invoke this by simply select the "Today" tab in the main view which lists:

- all patients scheduled for this instrument (identified by the instrument's AE Title) and with a Scheduled Procedure Step Start Date of the current date
- all patients that were selected in the advanced search during this session
- all patients that were examined today on the system

For more specific worklist queries the "Advanced" and then "Scheduled Patients" button can be used.

In either way the operator can select the wanted item from the result list to proceed with selecting an appropriate Requested Procedure and Scheduled Procedure Step for data acquisition. According to the transferred data IOLMaster 700 creates an entry in the local database.

This activity generates a Scheduled Case.

##### Query remote AE for patients

When the patient arrives at the IOLMaster 700 the operator can search patients stored at a remote AE. This can be done by using the "Quick search" in the main screen or by using "Advanced" and then the "All Patients" for a more detailed search. Any matching results will be listed in patient list.

The operator can then select a patient for data acquisition or calculation.

This activity generates an Unscheduled Case.

##### Acquire/Calculate data

When a patient or scheduled worklist item is selected the operator can start biometry data acquisition and IOL calculation for the patient's eyes. The Application Software allows the user to review the acquired biometry data and calculation results before permanently saving the data.

This activity creates biometry measurement data and IOL calculation results.

Data created by this activity might become subject of the activity "Store data to remote AE".

##### Create report

The operator can invoke the creation of a report based on measured and calculated data. This report can be printed out directly.

Furthermore, reports are created on-the-fly and without any manual intervention whenever measurement data and/or IOL calculation results are about to be archived during activity "Store data to remote AE" since measurement data is always archived together with an electronic report.

##### Store data to remote AE

This activity can be invoked manually by the operator by

- selecting an existing measurement from the measurements list and pressing "Export"
- finishing the "Patient > Measurement > Analysis > IOL Calculation" workflow with pressing "Save & Export"

Once triggered, the application software transfers all data that has been created during the workflow and is subject of storage to the configured Storage AE. The activity automatically invokes the Activity "Create report".

Depending on quality of measured data and user export configuration during the "Store data to remote AE" activity the following instances are transferred to the configured Storage Provider:

- 1 Encapsulated Pdf SOP instances containing acquired data, calculation results and evidence reports
- 0..2 Ophthalmic Photography 8 Bit Image SOP instances containing reference images
- 0..1 Ophthalmic Axial Measurements SOP instances containing acquired axial length data
- 0..2 Multi-frame Grayscale Byte Secondary Capture Image SOP instances containing axial quality control images
- 0..1 Keratometry Measurements SOP containing acquired keratometric data
- 0..2 Multi-frame Grayscale Byte Secondary Capture Image SOP instances containing corneal quality control images

- 0..2 Ophthalmic Photography 8 Bit Image SOP instances containing white-to-white images
- 0..1 Intraocular Lens Calculations SOP instance containing IOL calculation results

After a configurable amount of time, the Application Software asks the configured Storage Commitment Provider to take over responsibility on data persistence for the data previously transferred to the remote Storage AE.

Due to the versatility of the underlying acquisition technology the application is able to acquire biometry data of different type in a single measurement procedure. During the "Store data to remote AE" activity these data will get "split" and stored to various SOP instances according to its type of data. To signify and maintain the relationship and affiliation of these instances the following relationship information is added to the instances (see also Figure 4-2 SOP instance relationship):

- a) Report instance(s) are identified as "master" instances and will always contain a list of references to all SOP instances created for a particular measurement:
  - this list is stored by (0042,0013) Source Instance Sequence
  - references are uni-directional
- b) One single IOLMaster exam is considered as one Performed Procedure Step. Thus, all SOP instances belonging to that measurement will share the same Performed Procedure Step information:
  - ID - Performed Procedure Step ID (0040,0253)
  - Date - Performed Procedure Step Start Date (0040,0244)
  - Time - Performed Procedure Step Start Time (0040,0245)
  - Description - Performed Procedure Step Description (0040,0254)

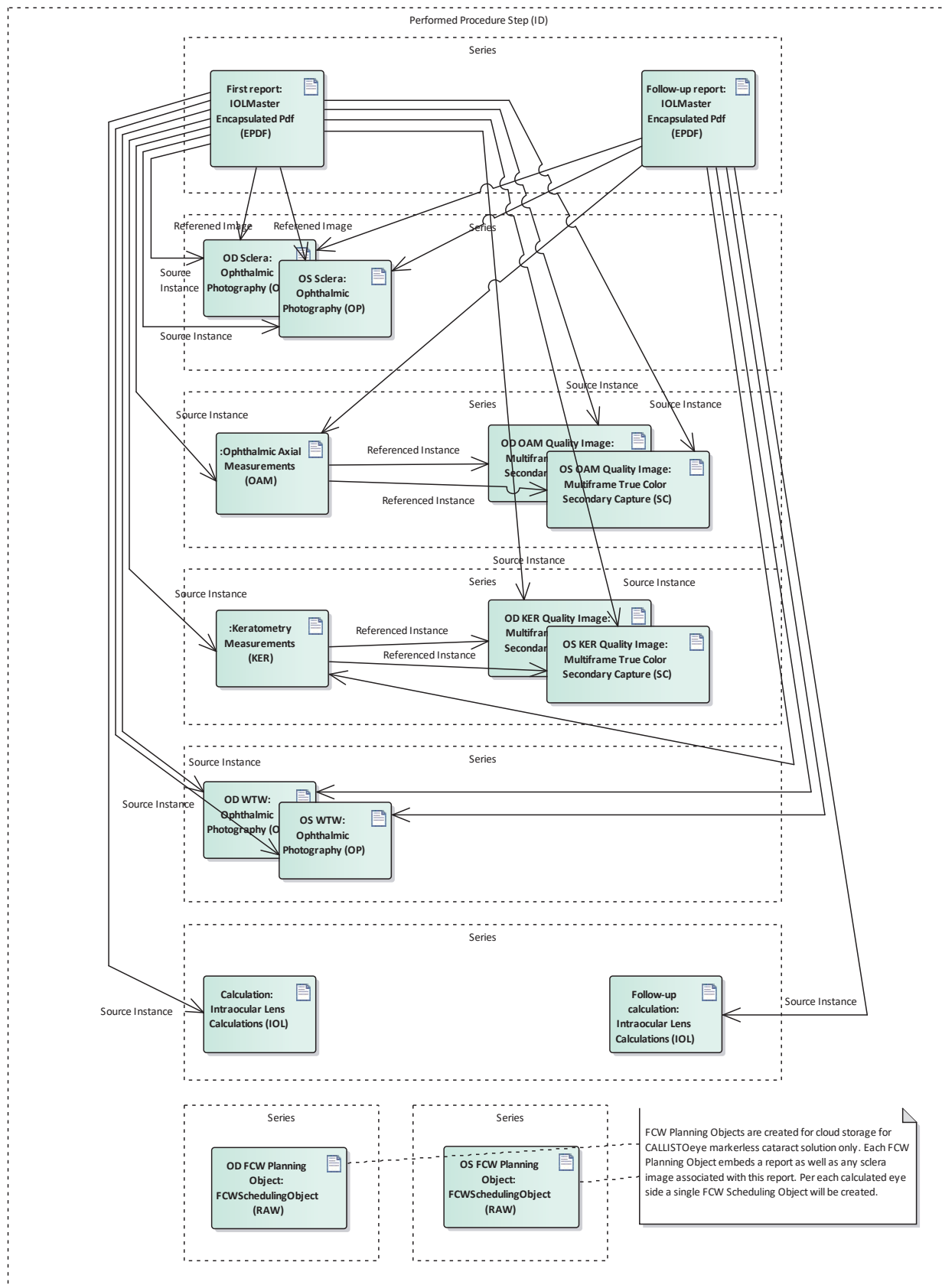


Figure 4-2 SOP instance relationship

## Delete data

This activity allows a user to delete data from the modality. Either specific measurements or complete patient data can be deleted. Deletion of data can only be triggered manually.

### 4.1.3.2 Scheduled case

The normal case is that the patient arrives at the front desk. There could be two possibilities at this point:

- The examination can be scheduled for the instrument.
- The examination was scheduled in advance.

In either case all patient and study related information is available at the day the examination takes place. On the IOLMaster 700 these patients appear in the "Today" list in the main screen. This information is used to take the examination.

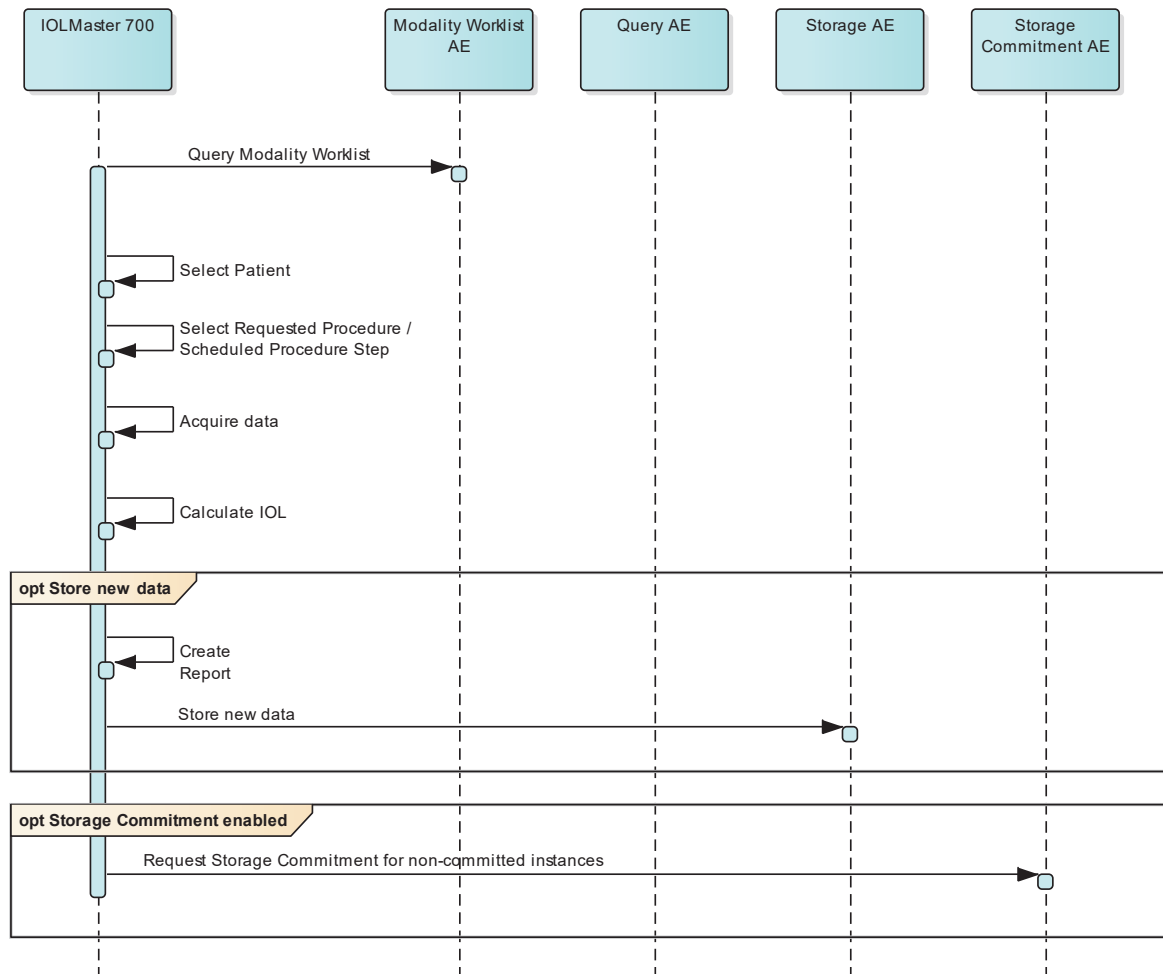


Figure 4-3 Scheduled case

### 4.1.3.3 Unscheduled case

In the unscheduled case the patient arrives immediately at the instrument, so that the patient was not registered at the front desk or the software does not support DICOM modality worklist. Thus the examination is not scheduled in the Modality Worklist. Patient demographics and study specific information has to be generated at the instrument itself. The situation is akin to the case if the Modality Worklist AE could not be reached due to network issues.

Patient demographics can be queried from the Query Service Class Provider. However, this should be considered as an exceptional way to obtain patient demographics.

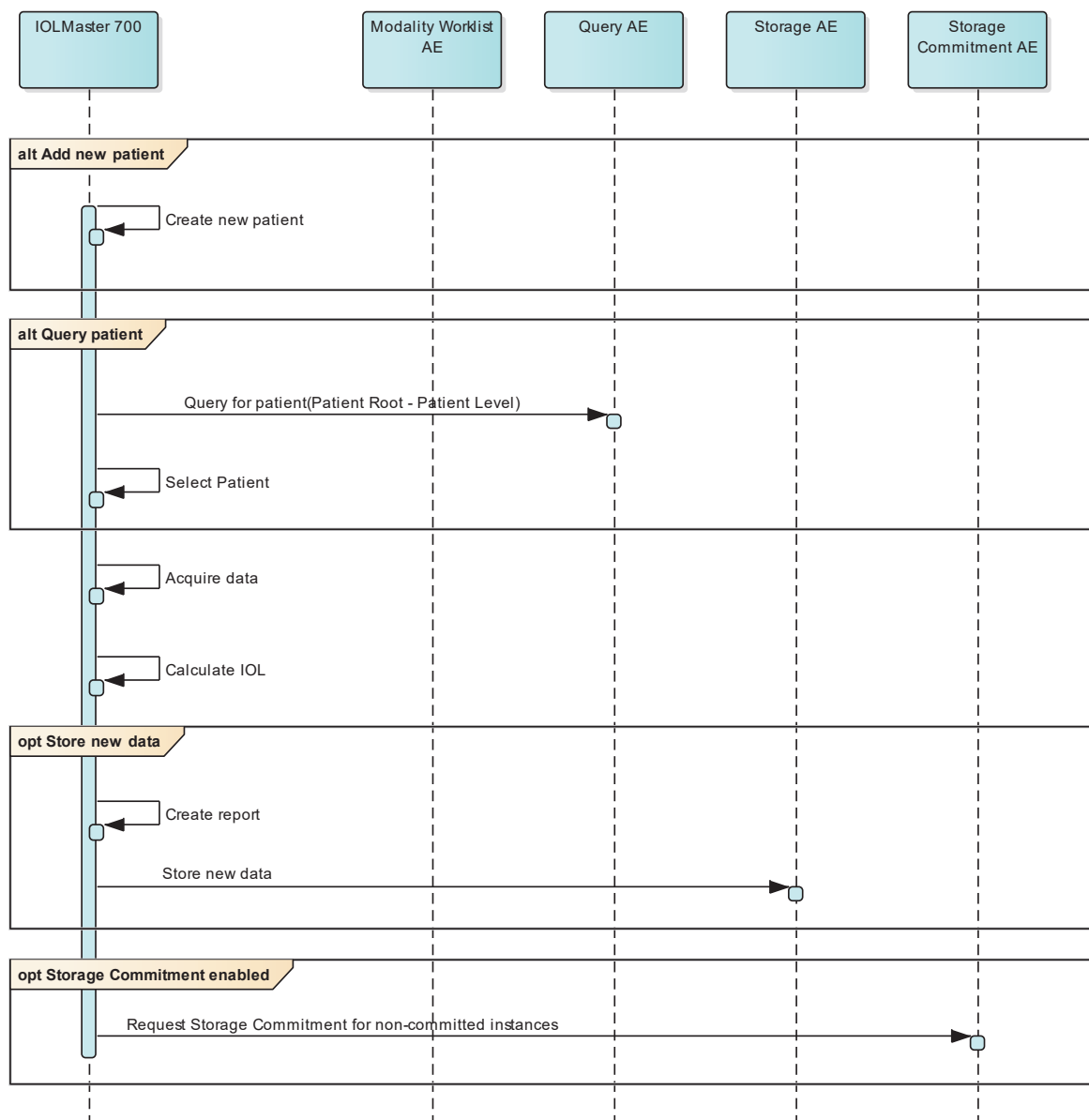


Figure 4-4 Unscheduled case

## 4.2 AE Specifications

### 4.2.1 IOLMaster 700 AE Specification

#### 4.2.1.1 SOP Classes

Table 4-1 SOP Classes for IOLMaster 700 AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	No

Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	No
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	Yes	No
Ophthalmic Axial Measurements Storage	1.2.840.10008.5.1.4.1.1.78.7	Yes	No
Intraocular Lens Calculations Storage	1.2.840.10008.5.1.4.1.1.78.8	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No

#### 4.2.1.2 Associations Policies

##### 4.2.1.2.1 General

The DICOM standard Application Context Name for DICOM 3.0 is always proposed:

**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 depends on the usage profile. At a certain point of time there might be active simultaneously:

- 1 association for Verification
- 1 association for Storage
- 1 association for Storage Commitment
- n associations for Modality Worklist - FIND, depending on whether search criteria are changed while a previous query is still active (no response yet)
- n associations for Query/Retrieve - FIND, depending on whether search criteria are changed while a previous query is still active (no response yet)

**Table 4-3 Number of associations**

Maximum number of simultaneous associations	50
---	----

##### 4.2.1.2.3 Asynchronous Nature

IOLMaster 700 Application Software 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	1.2.276.0.75.2.5.20
Implementation Version Name	NIM-2.9.0

#### 4.2.1.3 Association Initiation Policy

##### 4.2.1.3.1 Activity - Verify Communication

###### 4.2.1.3.1.1 Description and Sequencing of Activities

This activity is available during the configuration phase. It facilitates the setup and management of the DICOM Application Entities.

The user can test the application level communication between instrument's software Application Entity and its peer DICOM Application Entities. During one test call, all configured peer DICOM Application Entities are contacted.



In the association request IOLMaster 700 Application Software proposes not only Verification SOP Class, but also all other SOP Classes as supported by the instrument's DICOM interface.

The association is established when the peer DICOM entity accepts the verification related presentation context. In a sub-sequent step a C-ECHO message is exchanged.

The results of the "Verify Communication" activity are shown to the user as success or failure. For e. g. a Storage Provider not only the Verification information is evaluated, but also the acceptance of the proposed presentation context comprising the respective Storage SOP Classes.

#### 4.2.1.3.1.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- Verification with Transfer Syntax ILE as SCU

**Table 4-5 Proposed Presentation Contexts for Activity Verify Communication**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	5.1.4.1.1.7.2	JPG-1	1.2.4.50	SCU	None
Ophthalmic Photography 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	None
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Ophthalmic Axial Measurements Storage	5.1.4.1.1.78.7	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Intraocular Lens Calculations Storage	5.1.4.1.1.78.8	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes <sup>1)</sup>
Study Root Query/Retrieve IM – FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes <sup>1)</sup>
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note 1: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

**Table 4-6 Extended Negotiation as a SCU**

SOP Class Name	SOP Class UID	Extended Negotiation
Patient Root Query/Retrieve IM – FIND	1.2.840.10008.5.1.4.1.2.1.1	See Note 1
Study Root Query/Retrieve IM - FIND	1.2.840.10008.5.1.4.1.2.2.1	See Note 1, 2

Note 1: Extended negotiation for relational-queries is offered. Relational-query support by the SCP is required for successful Patient Root Query issued by the IOLMaster 700.

Note 2: Study Root Query/Retrieve Information Model – FIND is negotiated but not used by IOLMaster 700.

#### 4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The IOLMaster 700 Application Software provides standard conformance.

#### 4.2.1.3.2 Activity - Query Modality Worklist

The worklist contains scheduling information for patients. Query Modality Worklist is used to search for the right scheduling information for this instrument. An operator has two options to perform this activity.

##### 4.2.1.3.2.1 Description and Sequencing of Activities

###### Option "Today's Patients query"

In this case, the Application Software performs a query with predefined query keys. The applied query keys are:

**Table 4-7 Modality Worklist Query for Today's Patients**

Tag	Attribute Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	
>(0040,0001)	Scheduled Station Application Entity Title	Default: AE Title as configured for the IOLMaster 700 instrument. See Note 1
>(0040,0002)	Scheduled procedure Step Start Date	Default: Today's Date See Note 1
>(0008,0060)	Modality	Default: empty See Note 1

Note 1: In the Network Settings the default values of these three query keys for Today's Patients Modality Worklist Query can get modified. See Table 4-34 Configuration Parameters Table for details.

All matching worklist items are presented to the operator in the "Today" list and the application keeps all item data needed for further processing. After that, the operator can select one item from that list, choose the appropriate Requested Procedure and Scheduled Procedure Step and start the examination of the patient and acquire measurement data. Once a measurement has been acquired all work item data is persisted along with the instance in the database.

This default query can be manually triggered by simply pressing the button in the header of the "Today" list. This default query is also triggered automatically in a configurable interval to keep the "Today" List up to date if option "Automatic MWL Update" is switched on.

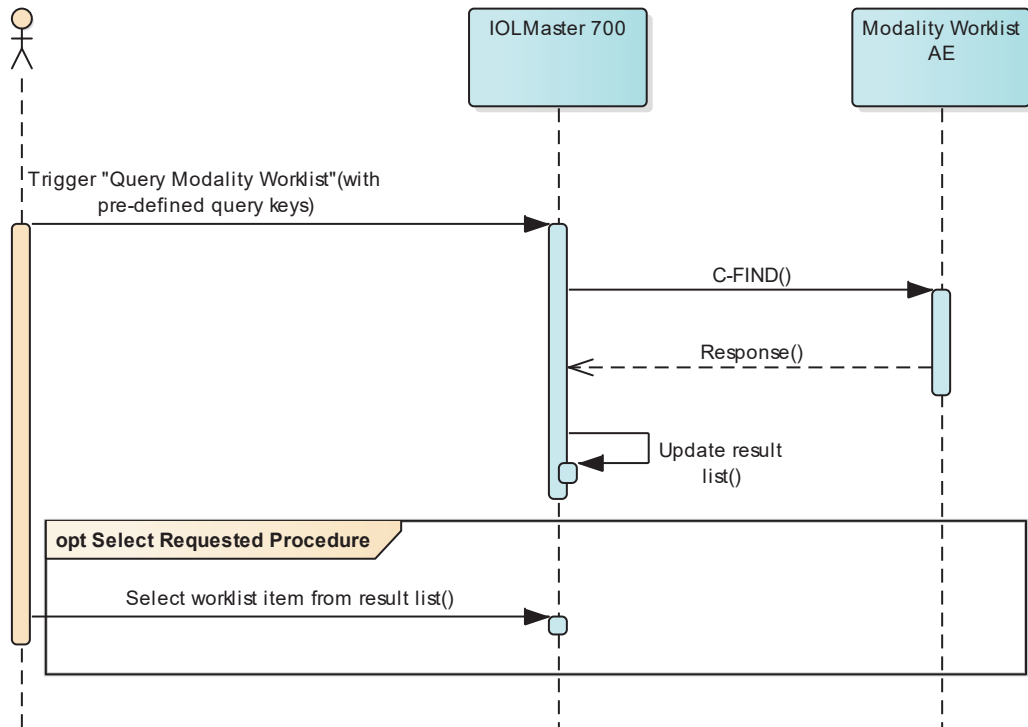


Figure 4-5 Query Modality Worklist - Today's Patients Query

#### Option "Interactive query"

The query keys of the "Interactive query" can be modified by the operator. To modify the query key the operator has to use "Advanced" in the main screen and use the tab "Scheduled Patients". This screen will provide all available search fields for the Modality Worklist search.

The operator can select the patient itself after the Modality Worklist search. In this case the patient will be added to the Today's Patients list and the operator can perform an unscheduled acquisition. No Requested Procedure – Scheduled Procedure Step information is added.

Alternatively the operator can display the Modality Worklist Details for a selected patient. In the Details screen the operator can select a Requested Procedure and add the patient to the Today's Patients list including the selected Requested Procedure information. (Scheduled Case)

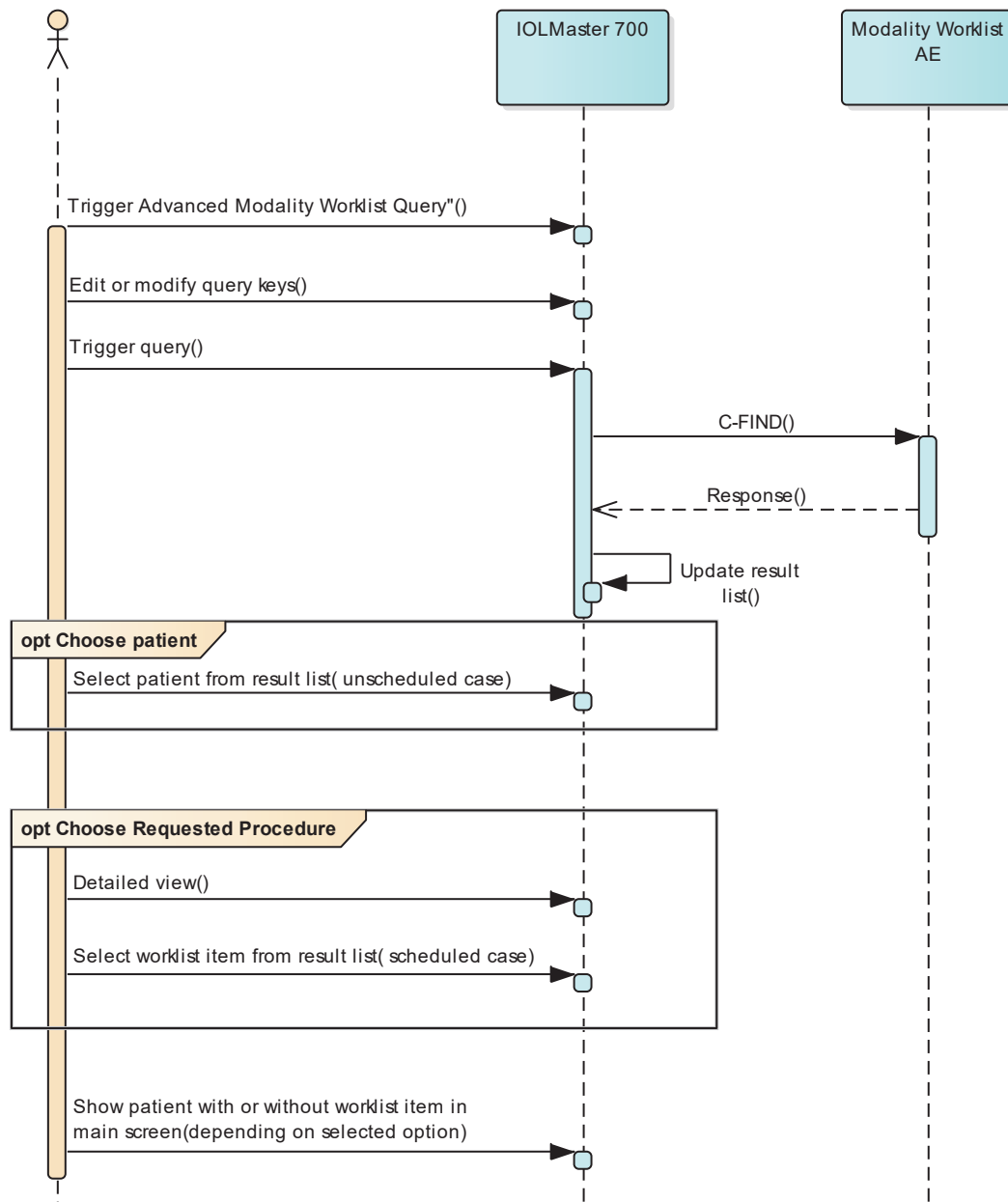


Figure 4-6 Query Modality Worklist - Interactive Query

### Trigger "Query Modality Worklist"

The activity "Query Modality Worklist" can be triggered by operator at any time if no other activity is in progress. To invoke the query the operator has to use "Advanced" in the main screen and use the tab "Scheduled Patients". It is meaningful to perform the query when the patient arrives at the modality. Then the worklist contains latest information.

### Edit or modify query keys

The Modality Worklist query offers a GUI for interactive query. The "Scheduled Station AE Title" is prefilled with the instrument AE title and the "Schedule date" is predefined with "All" (all dates). All predefined values can be changed. The operator can change or fill in search criteria in the shown dialog. For instance, the incomplete patient name or the patient ID can be used.

### Trigger query

The operator triggers the search after he filled in search criteria by pressing the "Search" button. The Application Software sends a DICOM C-FIND request, which contains the search criteria. The Application Software waits for the response from the partner Application Entity. Application Software will accept up to a configurable number of matches. The Application Software checks whether the number of received worklist items overstepped this configured limit and in such case sends a C-CANCEL-RQ, then an A-RELEASE-RQ to the service provider. A message is displayed to the operator accordingly. Despite this warning, the operator gets results in the result list.

After receiving the response, the pick-list is updated. The result-list provides the most important information for a quick overview (see section 4.2.1.3.2.3 for the supported set of tags).

The operator can start over, redefine query keys and trigger the query again. This can be performed as often as required, until he or she finds the correct worklist item.

### Select patient from result list

The operator can select one or more patients in the pick-list and return to the acquisition screen. In this case the scheduling information is lost and the workflow results in an unscheduled case.

### Detailed view

The detailed view can be activated by pressing the "Details" button. A detailed view allows a closer look to all received worklist item for the selected patient. The operator can see more information about patient information and scheduling information.

### Select Requested Procedure

In the detailed view the operator has the option to select a dedicated Requested Procedure with all associated Scheduled Procedure Steps by clicking on the Select button of the highlighted Requested Procedure.

### Show worklist item in main screen

The operator can take over the selected item at any time by pressing the "Select" button. The item is stored in the list of "Today" and the application keeps all item data needed for further processing. After that, the operator can start the examination of the patient and acquire measurement data. Once a measurement has been acquired for this item all item data is persisted along with the instance in the database.

### 4.2.1.3.2.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- "Modality Worklist IM - FIND" with Transfer Syntax ILE as SCU

**Table 4-8 Proposed Presentation Contexts Activity Query Modality Worklist**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	5.1.4.1.1.7.2	JPG-1	1.2.4.50	SCU	None
Ophthalmic Photography 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	None
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Ophthalmic Axial Measurements Storage	5.1.4.1.1.78.7	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Intraocular Lens Calculations Storage	5.1.4.1.1.78.8	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None

Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes <sup>1)</sup>
Study Root Query/Retrieve IM – FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes <sup>1)</sup>
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note 1: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

**Table 4-9 Extended Negotiation as a SCU**

SOP Class Name	SOP Class UID	Extended Negotiation
Patient Root Query/Retrieve IM – FIND	1.2.840.10008.5.1.4.1.2.1.1	See Note 1
Study Root Query/Retrieve IM - FIND	1.2.840.10008.5.1.4.1.2.2.1	See Note 1, 2

Note 1: Extended negotiation for relational-queries is offered. Relational-query support by the SCP is required for successful Patient Root Query issued by the IOLMaster 700.

Note 2: Study Root Query/Retrieve Information Model – FIND is negotiated but not used by IOLMaster 700.

#### 4.2.1.3.2.3 SOP Specific Conformance for Modality Worklist SOP Class

**Table 4-10 Modality Worklist C-FIND Response Status Handling Behavior**

Service Status	Further Meaning	Error Code	Behavior
Failure	Refused: Out of Resources	A700	Log message and display user alert message.
Failure	Identifier Does Not Match SOP Class	A900	Log message and display user alert message.
Failure	Unable to process	C000-CFFF	Log message and display user alert message.
Failure	Refused: SOP class not supported	0122	Log message and display user alert message.
Cancel	Matching terminated due to Cancel request	FE00	Log message
Success	Matching is complete	0000	The Software Application stops receiving worklist items. It finally updates the pick list.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Log message. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If the number of received worklist items overstepped the limit, then the Application Software sends a C-CANCEL-RQ, then an A-RELEASE-RQ to the service provider and a message is displayed.
Pending	Matches are continuing – Warning that one or more Optional Keys were not supported for existence and / or matching for this Identifier	FF01	Log message. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If the number of received worklist items overstepped the limit, then the Application Software sends a C-CANCEL-RQ, then an A-RELEASE-RQ to the service provider and a message is displayed.
Unknown	All other responses with unknown code meaning	xxxx	Log message and display user alert message

**Table 4-11 Modality Worklist C-FIND Communication Failure Behavior**

<b>Exception</b>	<b>Behavior</b>
DIMSE response timeout	The Association is aborted using A-ABORT. The reason is written to the log file. A user alert message is displayed.
Network Timeout	The Application Software is unable to connect to the remote Application Entity. The reason is written to the log file. A user alert message is displayed.
Maximum Association Idle Time exceeded	The Artim timer expires and the socket is closed. The reason is written to the log file.

**Table 4-12 Attributes involved in Modality Worklist C-FIND request and response**

Tag	Tag Name	Query Keys Matching	Mandatory Query Keys Return	Imported	Displayed	Modifiable	SOP Instance
<b>Scheduled Procedure Step (SPS)</b>							
(0040,0100)	Scheduled Procedure Step Sequence		X				
>(0040,0001)	Scheduled Station Application Entity Title	BRQ, DEF*	X <sup>1</sup>	X	PLD		
>(0040,0003)	Scheduled Procedure Step Start Time		X	X	PLD		
>(0040,0002)	Scheduled Procedure Step Start Date	BRQ, DEF*, SEL, RNG	X	X	PLD		
>(0008,0060)	Modality	BRQ, SEL DEF*	X <sup>2</sup>	X	PLD		
>(0040,0007)	Scheduled Procedure Step Description		X <sup>3</sup>	X	PLD		X
>(0040,0008)	Scheduled Protocol Code Sequence		X <sup>3</sup>	X			X
>>(0008,0100)	Code Value		X*	X			X
>>(0008,0102)	Coding Scheme Designator		X*	X			X
>>(0008,0103)	Coding Scheme Version			X			X
>>(0008,0104)	Code Meaning			X	PLD		X
>(0040,0009)	Scheduled Procedure Step ID		X	X			X
<b>Requested Procedure</b>							
(0040,1001)	Requested Procedure ID	PBQ	X	X	PLD		X
(0032,1060)	Requested Procedure Description		X <sup>4</sup>	X	PLD		X
(0032,1064)	Requested Procedure Code Sequence		X <sup>4</sup>	X			X
>(0008,0100)	Code Value		X*	X			X
>(0008,0102)	Coding Scheme Designator		X*	X			X
>(0008,0103)	Coding Scheme Version			X			X
>(0008,0104)	Code Meaning			X	PLD		X
(0020,000D)	Study Instance UID		X	X			X
(0008,0020)	Study Date			X			X
(0008,0030)	Study Time			X			X
(0008,1110)	Referenced Study Sequence			X			X
>(0008,1150)	Referenced SOP Class UID		X*	X			X
>(0008,1155)	Referenced SOP Instance UID		X*	X			X
(0040,1400)	Requested Procedure Comments			X	PLD		
<b>Imaging Service Request</b>							
(0008,0050)	Accession Number	PBQ		X	PLD		X
(0008,0090)	Referring Physicians Name			X	PLD		X
<b>Patient Identification</b>							



(0010,0010)	Patients Name <sup>1</sup>	PBQ	X	X	PL, PLD, APP		X
(0010,0020)	Patients ID	PBQ	X	X	PL, PLD, APP		X
(0010,0021)	Issuer of Patient ID			X	PLD		X
(0010,1000)	Other Patient IDs			X			X
<b>Patient Demographic</b>							
(0010,0030)	Patients Birth Date			X	PL, PLD, APP		X
(0010,0040)	Patients Sex			X	PL, PLD, APP		X
(0010,2160)	Ethnic Group			X			X
(0010,4000)	Patients Comments			X			X

Note 1: If the multicomponent name representation is enabled then the name components with Priority 1 and Priority 2 are shown in the PL, the name components with Priority 1 is shown in the PLD and the name component what have been entered as query key will be always sent in the Alphabetic group of the C-Find-RQ (see section 4.4.2.1 for the setting of multicomponent group names).

Note 2: Only patient's first name and last name are displayed in the GUI, but the entire name including all five components of all three component groups are imported and copied into the storage SOP Instance.

Note 3: All attributes with grey background are by default excluded from the list of Modality Worklist C-FIND-RQ matching keys. If needed they can get activated by service personnel.

#### Values of column "Query Key Matching":

##### PBQ

A tag that is marked with PBQ is used as query key in the Patient Based Query mode of the interactive Modality Worklist Query Dialog.

##### BRQ

A tag that is marked with BRQ is used as query key in the Broad Query mode of the interactive Modality Worklist Query Dialog.

##### DEF

A tag that is marked with DEF has a value assigned when the interactive Modality Worklist Query Dialog is shown the first time or when the Reset button is pushed.

Default values can get modified. The modifications will be stored for next use of Modality Worklist Query Dialog.

##### DEF\*

The default value of the associated attribute can be configured in the DICOM settings screen.

##### RNG

The operator can apply a range as value for the query key.

##### SEL

The operator can select a value from a given list of values.

#### Values of column "Mandatory Query Key Return":

##### X

The tag shall be present in the Modality Worklist C-FIND response. If any required tag is missing the relevant Modality Worklist C-FIND response item (Scheduled Procedure Step) will be ignored and not imported by the application software.

##### X\*

The tag shall be present in the Modality Worklist C-FIND response if its enclosing sequence is present. If any required tag is missing the relevant Modality Worklist C-FIND response item (Scheduled Procedure Step) will be ignored and not imported by the application software.

##### X<sup>1</sup>

Scheduled Station Application Entity Title (0040,0001) shall be present in the Modality Worklist C-FIND response. However, if not present in response, application software will use the configured local AE title instead.

##### X<sup>2</sup>

Modality (0008,0060) shall be present in the Modality Worklist C-FIND response. However, if not present in response, application software will use "OAM" instead.

X<sup>3</sup>

Either the Scheduled Procedure Step Description (0040,0007) or the Scheduled Protocol Code Sequence (0040,0008) or both shall be present in the Modality Worklist C-FIND response.

X<sup>4</sup>

Either the Requested Procedure Description (0032,1060) or the Requested Procedure Code Sequence (0032,1064) or both shall be present in the Modality Worklist C-FIND response.

**Values of column "Imported":**

X

The value gets imported in the application. Thus this value may have influence in Information Objects which will be created as a result of the performed examination.

**Values of column "Displayed":**

PL

Values of this tag are instantly visible in the pick list.

PLD

Values of this tag are visible in the details dialog of the current selected pick list item.

APP

Values of this tag are visible in the application.

**Values of column "Modifiable":**

X

A value which has been imported to the application might be modified inside the application.

**Values of column SOP Instance:**

X

Values of marked tags will be stored in created SOP Instances. See section 8.1 "mapping of attributes" in 8.1.3 Attribute Mapping.

Following set of tags can be used as query key in the so called "**Patient Based Query**". The Patient Based Query is a working mode of the Modality Worklist Query Dialog.

**Table 4-13 Modality Worklist query key details - Patient Based Query**

Tag	Tag Name	Description
(0010,0010)	Patients Name <sup>1</sup>	The IOLMaster 700 Application Software supports family name and given name only. See Table 4-14 Modality Worklist query key – Patient's Name - Wildcard details
(0010,0020)	Patient ID	The operator can enter a string which conforms to the Value Representation LO.
(0008,0050)	Accession Number	The operator can enter a string which conforms to the Value Representation SH.
(0040,1001)	Requested Procedure ID	The operator can enter a string which conforms to the Value Representation SH.

Note 1: If the multicomponent group name representation is enabled the name component group which is defined as Priority 1 will contain the specified search string in the C-FIND-RQ data set.

**Table 4-14 Modality Worklist query key – Patient's Name - Wildcard details**

Multicomponent Group Name Representation		Search on Patient's Name: Search string entered in GUI: "Quincy"	Query key - Value in attribute (0010,0010) Patient's Name
Disabled		Last Name	Quincy*
		First Name	*^Quincy*
Enabled		Last Name	*=Quincy*

(see section 4.4.2.1 for the setting of multicomponent group names).	Priority 1 - Ideographic	First Name	*=^Quincy*
	Priority 1 - Phonetic	Last Name	*=*=Quincy*
		First Name	*=*=^Quincy*
	Priority 1 - Alphabetic	Last Name	Quincy*
		First Name	^Quincy*

Following set of tags can be used as query key in the so called "**Broad Query**". The Broad Query is a working mode of the Modality Worklist Query Dialog.

**Table 4-15 Modality Worklist query key details - Broad Query**

Tag	Tag Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	This attribute is the container for the tags as listed below. The sequence contains one item.
>(0040,0002)	Scheduled Procedure Step Start Date	The default value is today's date. The operator can change the value to tomorrow, week and can even enter date ranges.
>(0008,0060)	Modality	The operator can change the value and select one value of a predefined set of values including an empty string. Possible values are "OAM", "OP", "OPM", "OPT", "OPV", "IOL".
>(0040,0001)	Scheduled Station AE Title	The default value is set by configuration. The operator can enter the AE Title of another device or leave the field empty.

#### 4.2.1.3.3 Activity - Query remote AE for patients

Query is used to get patient information stored on a DICOM server.

##### 4.2.1.3.3.1 Description and Sequencing of Activities

There are two ways for the user to trigger a query request.

The "Quick search" in the main screen will search in "Patient Given Name", "Patient Last Name", "Patient ID", and "Patient Birth Date" in parallel.

The second way is the "Advanced" search. The user can select this search by clicking the "Advanced" button in the main screen.

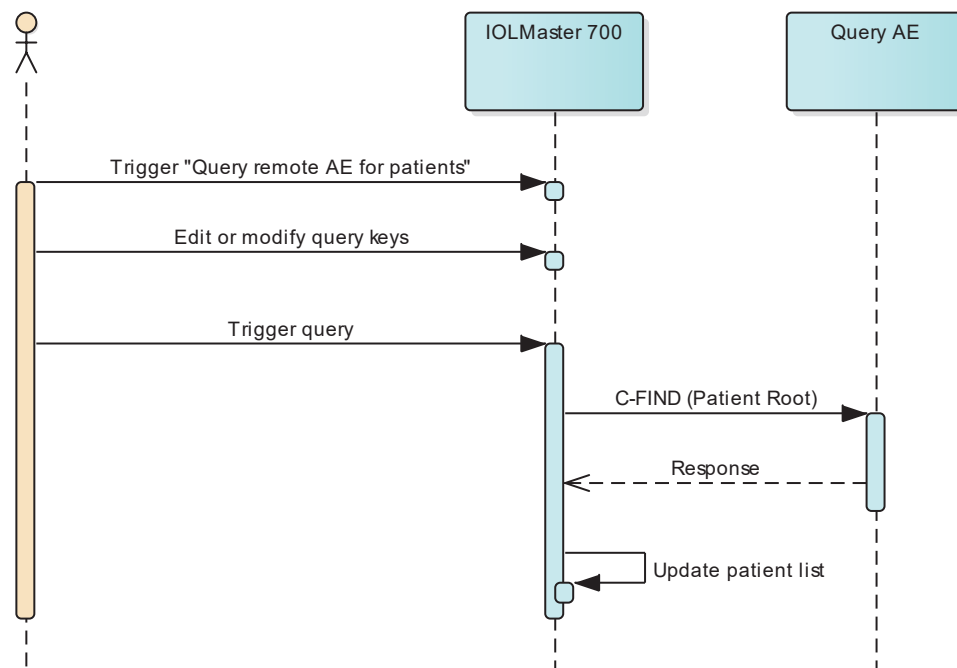


Figure 4-7 Query remote AE for patients

#### Trigger "Query remote AE for patients"

The activity "Query remote AE for patients" can be triggered by the operator by using the "Quick search" or change to the "Advanced" screen.

#### Edit or modify query keys

The "Advanced" screen offers a GUI for interactive query. The operator can change or fill in search criteria in the shown search fields.

The top-most search field in the main screen is the "Quick search" field. Any value entered herein is applied to

- (0010,0010) Patient's Name – Family Name
- (0010,0010) Patient's Name – Given Name
- (0010,0020) Patient ID
- (0010,0030) Patient's Birth Date

and issued as four separate requests. The entered value has automatically a trailing wildcard to fulfill the 'contains' condition.

For more details on supported query keys see Table 4-24 Query key details.

#### Trigger query

The operator triggers the search after he or she filled in search criteria by either pressing the "Enter" key or click on the "Search" button. The Application Software sends a Patient Root based DICOM C-FIND request which contains the entered search criteria. The Application Software waits for the response from the Query AE and checks whether the number of received items overstepped a configurable limit. In such case the application sends a C-CANCEL-RQ, then an A-RELEASE-RQ to the Query AE. A message about truncated search results is displayed to the operator and a request to apply more specific query keys. Despite this warning, the operator gets results in the pick-list.

After receiving the response, the patient pick-list is updated. The patient pick-list provides the most important information for a quick overview.

The operator can start over, redefine query keys and trigger the query again. This can be performed as often as required, until he or she finds the correct patient entry.

**Important note:** For this activity it is required that the SCP supports the Relational query model since Application Software does not use the Hierarchical model.

In case of patient identification conflicts between locally existing patients and entries from the query response list the application will always create a new patient beside the already existing one. The previously acquired data remains assigned to the old patient. New measurements can be performed for both patients the old and the new one.

#### 4.2.1.3.3.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- "Patient Root Query/Retrieve Information Model - FIND" with Transfer Syntax ILE as SCU

**Important note:** For this activity it is required that the SCP supports the Relational query model since Application Software does not use the Hierarchical model.

**Table 4-16 Proposed Presentation Contexts Query remote AE for patients and data**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	5.1.4.1.1.7.2	JPG-1	1.2.4.50	SCU	None
Ophthalmic Photography 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	None
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Ophthalmic Axial Measurements Storage	5.1.4.1.1.78.7	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Intraocular Lens Calculations Storage	5.1.4.1.1.78.8	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes <sup>1)</sup>
Study Root Query/Retrieve IM – FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes <sup>1)</sup>
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note 1: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

**Table 4-17 Extended Negotiation as a SCU**

SOP Class Name	SOP Class UID	Extended Negotiation
Patient Root Query/Retrieve IM – FIND	1.2.840.10008.5.1.4.1.2.1.1	See Note 1
Study Root Query/Retrieve IM - FIND	1.2.840.10008.5.1.4.1.2.2.1	See Note 1, 2

Note 1: Extended negotiation for relational-queries is offered. Relational-query support by the SCP is required for successful Patient Root Query issued by the IOLMaster 700.

Note 2: Study Root Query/Retrieve Information Model – FIND is negotiated but not used by IOLMaster 700.

#### 4.2.1.3.3.3 SOP Specific Conformance for Patient Root and Study Root Query/Retrieve SOP Class as SCU

**Table 4-18 Query C-FIND Response Status Handling Behavior**

Service Status	Further Meaning	Error Code	Behavior
Failure	Refused: Out of Resources	A700	Log message and display user alert.
Failure	Identifier does not match SOP Class	A900-A9FF	Log message and display user alert.
Failure	Unable to process	C000-CFFF	Log message and display user alert.
Failure	Refused: SOP class not supported	0122	Log message and display user alert
Cancel	Matching terminated due to Cancel request	FE00	None
Success	Matching is complete – No final Identifier is supplied	0000	The Software Application stops receiving worklist items. It finally updates the pick list.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Log message. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If the number of received worklist items overstepped the limit, then the Application Software sends a C-CANCEL-RQ, then an A-RELEASE-RQ to the service provider and a message is displayed.
Pending	Matches are continuing – Warning that one or more Optional Keys were not supported for existence and / or matching for this Identifier.	FF01	Log message. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If the number of received worklist items overstepped the limit, then the Application Software sends a C-CANCEL-RQ, then an A-RELEASE-RQ to the service provider and a message is displayed.
Unknown	All other responses with unknown code meaning	xxxx	Log message and display user alert

**Table 4-19 Query C-FIND Communication Failure Behavior**

Exception	Behavior
DIMSE response timeout	The Association is aborted using A-ABORT. The reason is written to the log file. A user alert message is displayed.
Network Timeout	The Application Software is unable to connect to the remote Application Entity. The reason is written to the log file. A user alert message is displayed.

Maximum Association Idle Time exceeded	The Artim timer expires and the socket is closed. The reason is written to the log file.
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**Table 4-20 PATIENT level keys for the Patient Root Query/Retrieve Information Model (request and response)**

Tag	Tag Name	Query Key Matching	Query Key Return	Imported	Displayed	Copied into SOP Instance
(0010,0010)	Patient's Name <sup>1</sup>	X		X	X	X
(0010,0020)	Patient ID	X	X	X	X	X
(0010,0021)	Issuer of Patient ID			X		X
(0010,0030)	Patient's Birth Date	RNG		X	X	X
(0010,0032)	Patient's Birth Time			X		
(0010,0040)	Patient's Sex			X	X	X
(0010,1000)	Other Patient IDs			X		X
(0010,2160)	Ethnic Group			X		X
(0010,4000)	Patient Comments			X		X

Note 1: If the multicomponent group name representation is enabled the name component group configured with Priority 1 is shown in the pick list and in the patient's details. The search string entered in patient's last name or first name is sent in the component group of the attribute (0010,0010) Patient's Name which corresponds to the representation configured as Priority 1 (see section 4.4.2.1 for the setting of multicomponent group names).

**Table 4-21 STUDY level keys for the Patient Root Query/Retrieve Information Model (request and response)**

Tag	Tag Name	Query Keys Matching	Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0008,0020)	Study Date					
(0008,0030)	Study Time					
(0008,0050)	Accession Number	X				
(0008,0061)	Modalities in Study					
(0008,0090)	Referring Physician's Name	X				
(0008,0090)	Study Description					
(0008,1080)	Admitting Diagnoses Description					
(0020,0010)	Study ID					
(0020,000D)	Study Instance UID					

**Table 4-22 SERIES level keys for the Patient Root Query/Retrieve Information Model (request and response)**

Tag	Tag Name	Query Keys Matching	Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0008,0021)	Series Date					
(0008,0031)	Series Time					
(0008,0060)	Modality	SEL				
(0008,103E)	Series Description					
(0008,1050)	Performing Physician's Name					
(0008,1090)	Manufacturer's Model Name					
(0020,000E)	Series Instance UID					
(0020,0011)	Series Number					
(0020,0060)	Laterality					
(0040,0244)	Performed Procedure Step Start Date					
(0040,0245)	Performed Procedure Step Start Time					
(0040,0275)	Request Attributes Sequence					

**Table 4-23 INSTANCE level keys for the Patient Root Query/Retrieve Information Model (request and response)**

Tag	Tag Name	Query Keys Matching	Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0008,0008)	Image Type					
(0008,0012)	Instance Creation Date					
(0008,0013)	Instance Creation Time					
(0008,0016)	SOP Class UID					
(0008,0018)	SOP Instance UID					
(0008,002A)	Acquisition DateTime	RNG				
(0008,114A)	Referenced Instance Sequence					
>(0008,1150)	Referenced SOP Class UID					
>(0008,1155)	Referenced SOP Instance UID					
(0020,0013)	Instance Number					
(0020,0062)	Image Laterality					

**Values of column "Query Key Matching":**

**RNG**

The operator can apply a range as value for the query key.

**SEL**

The operator can select a value from a given list of values.

**X**

The value is included in the query request if not empty.



**AUTO**

The value cannot be modified by the operator.

**Values of column "Query Keys Return":****X**

The tag shall be present in the Patient Root Query/Retrieve C-FIND response. If any required tag is missing the relevant Patient Root Query/Retrieve C-FIND response item will be ignored and not imported by the application software.

**Values of column "Imported":****X**

The value gets imported in the application. Thus this value may have influence in Information Objects which will be created as a result of the performed examination.

**Values of column "Displayed":****X**

Values of this tag are instantly visible in the pick list.

**Values of column "Copied into SOP Instance":****X**

Values of marked tags will be stored in created SOP Instances. See section "mapping of attributes" in 8.1.3 Attribute Mapping.

**Table 4-24 Query key details**

Tag	Tag Name	Description
(0010,0010)	Patient's Name <sup>1</sup>	The default value is empty string. Only family name and given name can be used as query keys. See Table 4-25 Query key – Patient's Name - Wildcard details. This is a DICOM Standard query key on Patient level.
(0010,0020)	Patient ID	The default value is empty string. The operator can enter each value that conforms to the Value Representation LO. This is a DICOM Standard query key on Patient level.
(0010,0030)	Patient's Birth Date	The default value is empty date. The operator can enter a specific value that conforms to the Value Representation DA. The operator can also select from a range of dates. This is a DICOM Optional query key on Patient level, thus the effect of this query key on the query depends on Service Provider implementation.
(0008,0050)	Accession Number	The default value is empty string. The operator can enter each value that conforms to the Value Representation SH. This is a DICOM Standard query key on Study level.
(0008,0090)	Referring Physician's Name <sup>2</sup>	The default value is empty string. Only family name can be used as query key. This is a DICOM Optional query key on Study level, thus the effect of this query key on the

		query depends on Service Provider implementation.
(0008,0060)	Modality	<p>The default value is empty string.</p> <p>The operator can select from a list of pre-defined values and the application software will convert the selection to a value that conforms to the Value Representation CS.</p> <p>This is a DICOM Standard query key on Series level.</p>

Note 1: If the multicomponent group name representation is enabled the name component group which is defined as Priority 1 will contain the specified search string in the C-FIND-RQ data set.

Note 2: Only Alphabetic part of the multicomponent group name is used as query key

**Table 4-25 Query key – Patient’s Name - Wildcard details**

Multicomponent Group Name Representation		Search on Patient’s Name – Search string entered in GUI: “Quincy”	Query key – Value in attribute (0010,0010) Patient’s Name
Disabled		Last Name	Quincy*
		First Name	*Quincy*
Enabled (see section 4.4.2.1 for the setting of multicomponent group names).	Priority 1 - Ideographic	Last Name	*=Quincy*
		First Name	*=*Quincy*
	Priority 1 - Phonetic	Last Name	*==Quincy*
		First Name	*==*Quincy*
	Priority 1 - Alphabetic	Last Name	Quincy*
		First Name	*Quincy*

#### 4.2.1.3.4 Activity - Acquire/Calculate data

Operator can invoke "Acquire/Calculate data" at any time if no other activity is in progress.

This activity has no direct relation to DICOM messaging.

The "Acquire/Calculate data" activity is always started by either selecting one item from the result lists of "Query Modality Worklist" or "Query remote AE for patients" or by entering new patient information in the "Patient details" screen.

During this activity, the Application Software creates Biometry measurement data, reference images, and/or IOL calculation results. Data created by this activity might become subject of the activity "Store data to remote AE".

#### 4.2.1.3.5 Activity - Create report

Operator can invoke the creation of a report based on measured and calculated data. This report can be printed out directly.

Furthermore, reports are created on-the-fly and without any manual intervention whenever measurement data and/or IOL calculation results are about to be archived during activity "Store data to remote AE". This is necessary since this data is always archived along with an electronic report.

#### 4.2.1.3.6 Activity - Store data to remote AE

This activity can be invoked manually by the operator by

- selecting an existing measurement from the measurements list and pressing "Export"
- finishing the "Patient > Measurement > Analysis > IOL Calculation" workflow with pressing "Save & Export"

In case of measurement data and/or calculation results the "Store data to remote AE" activity automatically creates an electronic report in the background (see 4.2.1.3.5 Activity - Create report).

This activity will pause for benefit of high priority activities (e.g. "Acquire/Calculate data") and resume after such activities has been finished.

Depending on quality of measured data and user export configuration during the "Store data to remote AE" activity the following instances are transferred to the configured Storage Provider:

- 1 Encapsulated Pdf SOP instances containing acquired data, calculation results and evidence reports
- 0..2 Ophthalmic Photography 8 Bit Image SOP instances containing reference images
- 0..1 Ophthalmic Axial Measurements SOP instances containing acquired axial length data
- 0..2 Multi-frame Grayscale Byte Secondary Capture Image SOP instances containing axial quality control images
- 0..1 Keratometry Measurements SOP containing acquired keratometric data
- 0..2 Multi-frame Grayscale Byte Secondary Capture Image SOP instances containing corneal quality control images
- 0..2 Ophthalmic Photography 8 Bit Image SOP instances containing white-to-white images
- 0..1 Intraocular Lens Calculations SOP instance containing IOL calculation results

After a configurable amount of time, the Application Software asks the configured Storage Commitment Provider to take over responsibility on data persistence for the data previously transferred to the remote Storage AE.

#### 4.2.1.3.6.1 Description and Sequencing of Activities

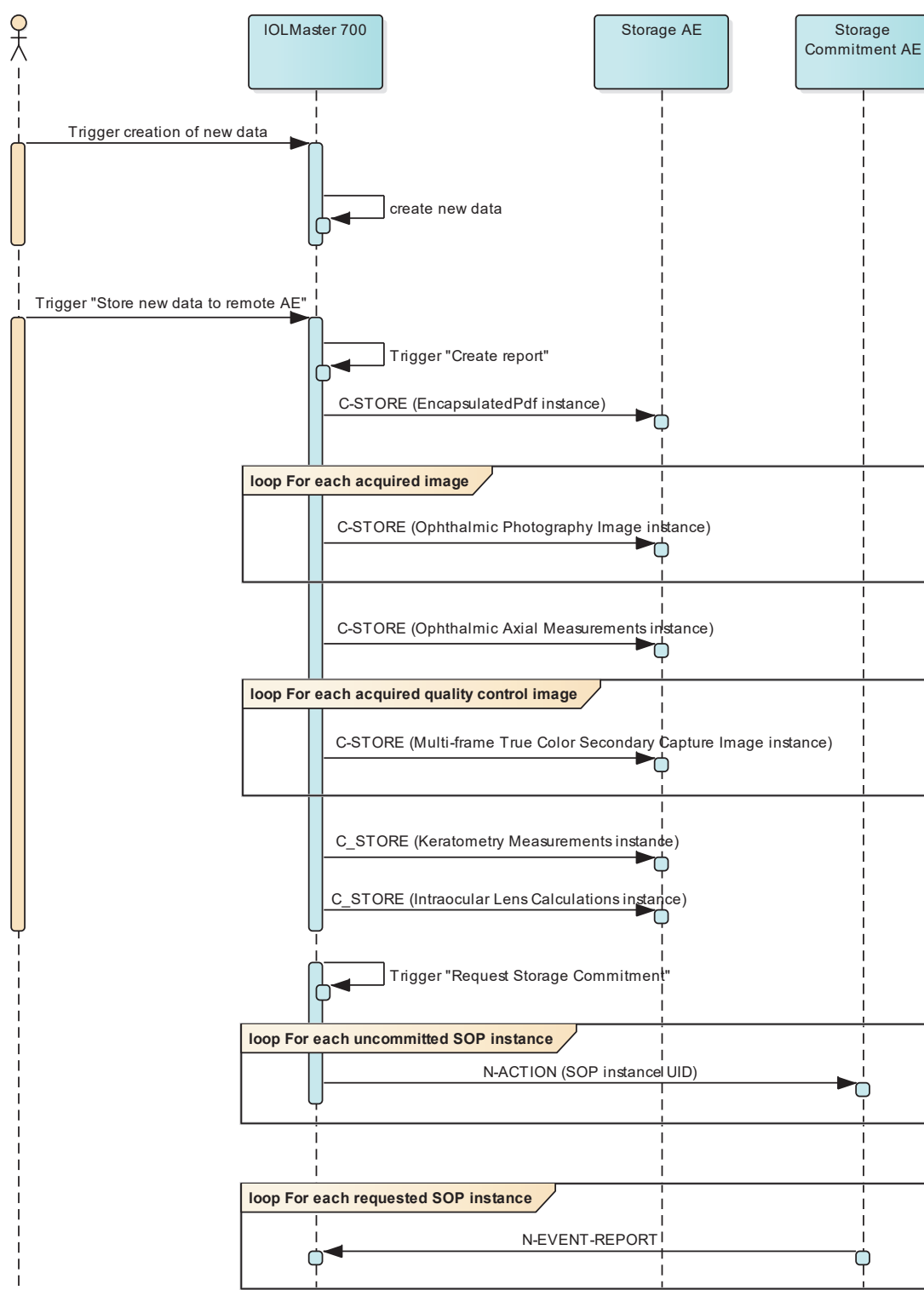


Figure 4-8 Store data to remote AE

### Trigger "Store new data to remote AE"

This activity can be invoked manually by the operator by

- selecting an existing measurement from the measurements list and pressing "Export"
- finishing the "Patient > Measurement > Analysis > IOL Calculation" workflow with pressing "Save & Export"

Once triggered, the application software transfers all data that has been created during the workflow and is subject of storage to the configured Storage AE.

For measurement data and/or calculation results the activity automatically creates an electronic report in the background (see 4.2.1.3.5 Activity – Create report).

### Request Storage Commitment

To verify that the data has been safely archived, the Application Software can be set up to request the configured Storage Commitment AE in a configurable interval to commit the storage of instances.

Data that has been successfully archived (stored and successfully committed) might be subject to be deleted at shutdown after a configurable caching time.

#### 4.2.1.3.6.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- Multi-frame Grayscale Byte Secondary Capture Image Storage with Transfer Syntax JPG-1 as SCU
- OP 8Bit Image Storage with Transfer Syntax JPG-1 as SCU
- Keratometry Measurements Storage with Transfer Syntax ELE (Transfer Syntax ILE as fallback) as SCU
- Ophthalmic Axial Measurements Storage with Transfer Syntax ELE (Transfer Syntax ILE as fallback) as SCU
- Intraocular Lens Calculations Storage with Transfer Syntax ELE (Transfer Syntax ILE as fallback) as SCU
- Encapsulated PDF Storage with Transfer Syntax ELE (Transfer Syntax ILE as fallback) as SCU
- Storage Commitment Push Model with Transfer Syntax ILE as SCU

**Table 4-26 Proposed Presentation Contexts for Activity Archive data**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	5.1.4.1.1.7.2	JPG-1	1.2.4.50	SCU	None
Ophthalmic Photography 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	None
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Ophthalmic Axial Measurements Storage	5.1.4.1.1.78.7	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Intraocular Lens Calculations Storage	5.1.4.1.1.78.8	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	None

		ELE	1.2.1	SCU	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes <sup>1)</sup>
Study Root Query/Retrieve IM – FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes <sup>1)</sup>
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note 1: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

**Table 4-27 Extended Negotiation as a SCU**

SOP Class Name	SOP Class UID	Extended Negotiation
Patient Root Query/Retrieve IM – FIND	1.2.840.10008.5.1.4.1.2.1.1	See Note 1
Study Root Query/Retrieve IM - FIND	1.2.840.10008.5.1.4.1.2.2.1	See Note 1, 2

Note 1: Extended negotiation for relational-queries is offered. Relational-query support by the SCP is required for successful Patient Root Query issued by the IOLMaster 700.

Note 2: Study Root Query/Retrieve Information Model – FIND is negotiated but not used by IOLMaster 700.

#### 4.2.1.3.6.3 SOP Specific Conformance for Storage SOP Classes

**Table 4-28 Storage C-STORE Response Status Handling Behavior**

Service Status	Further Meaning	Status Code	Behavior
Failure	Refused: Out of Resources	A700-A7FF	Log message and retry c-store. If error persists then message to user.
Failure	Error: Data Set does not match SOP Class	A900-AFF	Log message and do not retry. Message to user.
Failure	Error: Cannot understand	C000-CFFF	Log message and do not retry. Message to user.
Failure	Duplicate SOP Instance	0111	Log message and no retry.
Failure	Refused: SOP class not supported	0122	Log message and show user alert.
Warning	Coercion of data Elements	B000	The Application Software logs this event.
Warning	Data Set does not match SOP Class	B007	The Application Software logs this event.
Warning	Elements Discarded	B006	The Application Software logs this event.
Success	Successful Storage	0000	None
Unknown	All other responses with unknown code	xxxx	Log message and do not retry. Message to user.

#### 4.2.1.3.6.4 SOP Specific Conformance for Storage Commitment SOP Class

##### 4.2.1.3.6.4.1 Storage Commitment Operations (N-ACTION)

The Application Software will request storage commitment for instances of the Ophthalmic Photography 8 Bit Image Storage and Encapsulated PDF Storage IOD if the Remote AE is configured as Storage Commitment Provider and a presentation context for the Storage Commitment Push Model has been accepted.

The Storage Commitment Request addresses at least one SOP Instance and at maximum 500 SOP instances.

The behavior of the Application Software when encountering status codes in a N-ACTION response is summarized in the table below:

**Table 4-29 Storage Commitment N-ACTION Response Status Handling Behavior**

Service Status	Further Meaning	Status Code	Behavior
Failure	Class-instance conflict	0119	Log message and display user alert.
Failure	Duplicate invocation	0210	Log message.
Failure	Invalid argument value	0115	Log message and display user alert.
Failure	Invalid SOP Instance	0117	Log message and display user alert.
Failure	Mistyped argument	0212	Log message and display user alert.
Failure	No such action	0123	Log message and display user alert.
Failure	No such argument	0114	Log message and display user alert.
Failure	No such SOP class	0118	Log message and display user alert.
Failure	No such SOP Instance	0112	Log message.
Failure	Processing failure	0110	Log message and display user alert.
Failure	Resource limitation	0213	Log message.
Failure	Unrecognized operation	0211	Log message and display user alert.
Success	Success	0000	The Application Software will wait for an incoming N-EVENT-REPORT.
Unknown	All other responses with unknown code meaning.	xxxx	Log message and display user alert.

**Table 4-30 C-STORE Communication Failure Behavior**

Exception	Behavior
DIMSE response timeout	The Association is aborted using A-ABORT. The reason is written to the log file. A user alert message is displayed.
Network Timeout	The Application Software is unable to connect to the remote Application Entity. The reason is written to the log file. A user alert message is displayed.
Maximum Association Idle Time exceeded	The Artim timer expires and the socket is closed. The reason is written to the log file.

#### 4.2.1.3.6.4.2 Storage Commitment Communication Failure Behaviour

If the Application Software runs in a timeout or if the association is aborted by the provider or network layer, or if waiting duration for Storage Commitment N-EVENT-REPORT oversteps a configurable time limit then the related SOP Instance is considered as not being committed. Then the SOP Instance is subject of a future Storage Commitment service call. It will be included again within next call of this activity.

In addition to that, the Application Software writes the SOP Instance UID to the log file, together with the failure reason.

#### 4.2.1.3.7 Activity - Delete data

This activity removes selected data from the AE. It must be triggered manually by the operator by selecting an item from either the "Today", "Search results" or "Measured Exams" list of the "Patient" screen.

Scope of selection and deletion can be:

- a single patient (all data belonging to this patient and all associated measurements will be removed)
- a series of measurements of a patient of one day (all measurements of the patient of this day will be removed)
- a single measurement (all data belonging to this single measurement will be removed)

Deletion of data does not depend on the archive status of the selected data. Thus, the operator must ensure in advance that data has been successfully archived before invoking this activity.

Deletion of data does not remove any data from the configured Storage AE but only from the local data storage.

This activity can only be invoked manually by the operator, the AE does not support any automatic deletion of data.

#### 4.2.1.4 Association Acceptance Policy

##### 4.2.1.4.1 Activity - Verify Communication

The activity can be performed at any time. The service is available as soon as the Application Software has been started.

##### 4.2.1.4.1.1 Description and Sequencing of Activities

The Software AE responds to verification requests made by remote AEs.

##### 4.2.1.4.1.2 Accepted Presentation Contexts

**Table 4-31 Presentation Context accepted for Activity Verify Communication**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	... 1.1	ILE	... 1.2	BOTH	None

##### 4.2.1.4.1.3 SOP Specific Conformance for Verification SOP Class as SCP

The Application Software AE provides standard conformance.

##### 4.2.1.4.2 Activity - Store data to remote AE

This chapter describes the aspect of association acceptance of the activity "Store data to remote AE".

The activity stores biometry measurement data, IOL calculation results, evidence reports, reference images and quality control images as described in chapter "4.2.1.3.6 Activity - Store data to remote AE".

After a configurable amount of time, the Application Software asks the configured Storage Commitment Provider to take over responsibility on data persistence for the data previously transferred to the remote Storage AE.

##### 4.2.1.4.2.1 Description and Sequencing of Activities

The description and sequencing of activities is covered by chapter "4.2.1.3.6 Activity - Store data to remote AE".



#### 4.2.1.4.2.2 Accepted Presentation Contexts

**Table 4-32 Presentation Contexts accepted for Activity Archive data**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None

#### 4.2.1.4.2.3 SOP Specific Conformance for Storage SOP Class as SCP

The Application Software AE provides standard conformance.

#### 4.2.1.4.2.4 SOP Specific Conformance for Storage Commitment SOP Class

##### 4.2.1.4.2.4.1 Storage Commitment Operations (N-EVENT-REPORT)

The Application Software is capable of receiving an N-EVENT-REPORT notification if it has successfully negotiated a Presentation Context for the Storage Commitment Push

The behavior of Application Software when receiving Event Types within the N-EVENT-REPORT is summarized in the table below.

**Table 4-33 Storage Commitment N-EVENT-REPORT Request Failure Reasons**

Service Status	Further Meaning	Status Code	Behavior
Failure	Processing Failure	0110	The SOP Instance is also considered as not being committed. For a configurable amount of re-trials the SOP Instance is subject of a future Storage Commitment service request. It will be included again within next call of these activities.  In addition, the application software writes the SOP Instance UID to the log file with the failure reason.
Failure	No such object instance	0112	The SOP Instance is also considered as neither being archived nor being committed. The application will re-archive the original instance (for OP IOD) or a new instance based on the same measurement (for ePdf IOD).  In addition, the application software writes the SOP Instance UID to the log file with the failure reason.
Failure	Resource limitation	0213	The SOP Instance is also considered as not being committed. For a configurable amount of re-trials the SOP Instance is subject of a future Storage Commitment service request. It will be included again within next call of these activities.  In addition, the application software writes the SOP Instance UID to the log file with the failure reason.
Failure	Referenced SOP Class not supported	0122	The application software writes the SOP Instance UID to the log file with the failure reason.

Failure	Class / Instance conflict	0119	The SOP Instance is also considered as not being committed. For a configurable amount of re-trials the SOP Instance is subject of a future Storage Commitment service request. It will be included again within next call of these activities.  In addition, the application software writes the SOP Instance UID to the log file with the failure reason.
Failure	Duplicate transaction UID	0131	The SOP Instance is also considered as not being committed. For a configurable amount of re-trials the SOP Instance is subject of a future Storage Commitment service request. It will be included again within next call of these activities.  In addition, the application software writes the SOP Instance UID to the log file with the failure reason.
Unknown	All other responses with unknown code meaning	xxxx	Log message and retry storage commit for failed sop instance(s).

If the N-EVENT-REPORT contains failed instances the behavior of the application software depends on the failure reason associated with the failed instances. In general retry means a retry for 2 times, no retry will set the error counter to maximum. A reset of the error counter is possible in the application settings screen.

## 4.3 Network Interfaces

### 4.3.1 Physical Network Interface

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

### 4.3.2 Additional Protocols

Both IP addresses and host names are supported and get resolved.  
Else no additional protocols are supported.

### 4.3.3 IPv4 and IPv6 Support

Application software does only support IPv4 and does not support any IPv6 features.

## 4.4 Configuration

Local application entity and remote application entity information can be configured in the Networking section of the software application's "Settings" dialog. This dialog does also allow other networking and DICOM related settings like networking timeouts, worklist and patient query item limit parameters.

For institution related settings like Institution Name or Station Name an administrator can use the "General" section of the "Settings" dialog.

For AutoConnect™-enabled systems from ZEISS the configuration can be performed automatically using the AutoConnect button.

### 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 can be configured to be set up manually or to be administered by the Operating System. The Application Entity Title as well as the port number is configurable. The default port number is 11112. In case AutoConnect is enabled in both IOLMaster 700 and FORUM, the Local AE configuration is registered automatically in the FORUM AE Title Administration.

#### 4.4.1.2 Remote AE Titles

The mapping of external AE Titles to TCP/IP addresses and ports is configurable. The IOLMaster 700 Application Software allows setting up a remote Application Entity for each service. For all Application Entities, the host name or IP, the Port and the Application Entity Title must be known.

Mapping of DICOM services to remote AE can be done either manually or by using the AutoConnect feature. In case AutoConnect is enabled in both IOLMaster 700 and FORUM, the configuration of the Remote Application Entities can be performed automatically using the AutoConnect button.

### 4.4.2 Parameters

#### 4.4.2.1 General Parameters

The general parameters are shared for associations to any of the configured AE.

**Table 4-34 Configuration Parameters Table**

Parameter	Configurable (Yes/No)	Default Value
<b>General Parameters</b>		
DIMSE RSP Timeout	Yes (10 – 60 sec.)	20 sec
Network Timeout	Yes (5-20 sec.)	20 sec.
Max. Association Idle Time	Yes (10 – 60 sec.)	30 sec
Network log level	Yes	Warning
Storage Commitment for failed instances	No <sup>1)</sup>	Re-archive
(0008,0080) Institution Name	Yes	EMPTY
(0008,1040) Institutional Department Name	Yes	EMPTY
(0008,0081) Institution Address	Yes	EMPTY
(0008,1010) Station Name	Yes	EMPTY
(0010,0021) Issuer of Patient ID	Yes	IOLMaster-700 + Device Serial Number
Use multicomponent group name representation	Yes	Disabled
DICOM Export	Yes (Disabled, File, Server)	Disabled
<b>AE Specific Parameters</b>		
Number of simultaneous Associations by Service and/or SOP Class?	No	50
<b>Verification SCU Parameters</b>		
No specific configuration required.		
<b>Modality Worklist SCU Parameters</b>		
Maximum Query Responses (Modality Worklist IM, Patient Root Q/R IM and Study Root Q/R IM)	Yes (10-999)	200
Automatic MWL update	Yes	Enabled

Today's Patient List Refresh Rate (Modality Worklist Polling Interval)	Yes (Min. – Max.)	5 min
Scheduled Station AE Title (Today's Patient Query)	Yes Possible values: - Use local AE Title - Empty value - User configurable value	Same as Local AE Title (IOLMASTER)
Modality (Today's Patient Query)	Yes Possible Values: - "All" (Empty) - Value from pre-defined list (Table 4-15 Modality Worklist query key details - Broad Query)	EMPTY
Scheduled Procedure Step Start Date (Today's Patient Query)	Yes Possible Values: - Today - Tomorrow - Week (Today – Today + 7 days) - All dates	Today
Specific Character Set <sup>2</sup>	Yes (by service personnel only)	None (IOLMaster 700 Application Software uses UTF-8)
<b>Patient Root Q/R and Study Root Q/R SCU Parameters</b>		
Maximum Query Responses (Modality Worklist IM, Patient Root Q/R IM and Study Root Q/R IM)	Yes (10-999)	200
Extended Negotiation – relational query support negotiation (Patient Root Q/R IM and Study Root Q/R IM)	Yes	Enabled
Specific Character Set <sup>2</sup>	Yes (by service personnel only)	None (IOLMaster 700 Application Software uses UTF-8)
<b>Storage Commitment SCU Parameters</b>		
Storage Commitment enable/disable	Yes	Enabled
Storage Commitment Interval	Yes	15 min
Re-archive or Delete instances after N-EVENT-REPORT with Failure Reason "0112H"	No <sup>1</sup>	Re-Archive
<b>Storage SCU Parameters</b>		
The configuration of port number and Application Entity Title are part of the Remote Application Entity setup (see 4.4.1.2 Remote AE Titles).		
Specific Character Set <sup>2</sup>	Yes (by service personnel only)	None (IOLMaster 700 Application Software uses UTF-8)
Export biometry measurement data. Create following SOP instances during export:	Yes	Disabled

<ul style="list-style-type: none"> <li>Ophthalmic Axial Measurements Storage</li> <li>Multi-frame Grayscale Byte Secondary Capture Image Storage containing axial quality control images</li> </ul>		
Export keratometry measurement data. Create following SOP instances during export: <ul style="list-style-type: none"> <li>Keratometry Measurements Storage</li> <li>Multi-frame Grayscale Byte Secondary Capture Image Storage containing corneal quality control images</li> </ul>	Yes	Disabled
Export sclera reference images. Create following SOP instances during export: <ul style="list-style-type: none"> <li>Ophthalmic Photography 8 Bit Image Storage (Image type: SCLERA)</li> </ul>	Yes	Enabled
Export white-to-white images. Create following SOP instances during export: <ul style="list-style-type: none"> <li>Ophthalmic Photography 8 Bit Image Storage (Image type: WHITE_TO_WHITE)</li> </ul>	Yes	Enabled
Export IOL calculation results. Create following SOP instances during export: <ul style="list-style-type: none"> <li>Intraocular Lens Calculations Storage</li> </ul>	Yes	Disabled
Content of export IOL calculation results.	Yes (Selected result current eye   Selected results for both eyes   All calculated results for current eye   All calculated results for both eyes)	Selected result current eye
<b>Verification SCP Parameters</b>		
No specific configuration required The configuration of port number and Application Entity Title are part of the Local Application Entity setup (see 4.4.1.1 Local AE Titles).		

Note 1: This setting is not supported by the application software. Although there is a UI configurable parameter it'll always default to "Re-Archive instance".

Note 2: DICOM Specific Character Set (Configuration settings available for Service user only)

**Table 4-35 Specific Character Set**

Parameter		Default Value
Available DICOM character set for Modality Worklist, Query, Retrieve, Storage		
Defined Term	Description	
None <sup>3</sup>		None
ISO_IR 100	Latin alphabet No. 1	
ISO_IR 101	Latin alphabet No. 2	
ISO_IR 109	Latin alphabet No. 3	
ISO_IR 110	Latin alphabet No. 4	
ISO_IR 148	Latin alphabet No. 5	
ISO_IR 144	Cyrillic	
ISO_IR 127	Arabic	
ISO_IR 126	Greek	

ISO_IR 138	Hebrew	
ISO_IR 13	Japanese	
ISO_IR 166	Thai	
GB18030	Chinese	
ISO_IR 192	Unicode in UTF-8	

Note 3: Per default the IOLMaster 700 Application Software uses ISO\_IR 192 (UTF-8), (Setting is "None"). Modification to the default settings is only recommended in case of integration issues which result in incorrect interpretation of transmitted characters. See chapter 6 Support of Character Sets for more information.

## 5 Media Interchange

Media Interchange is not scope of this document since Media Interchange is not supported by IOLMaster 700 Application Software.

## 6 Support of Character Sets

All application entities described in the previous chapters support UTF-8 character set per default.

A specific character set can be provided optionally and individually per remote Service Provider with the exception of the Storage Commitment service, where specific character set is not needed. Possible defined terms for the character set element are listed in. IOLMaster 700 Application Software does not support Code Extension techniques via configuration, so ISO 2022 standard cannot be used.

**Table 6-1 Supported Character Set**

Supported Specific Character Set	
Character Set Description	Defined Term
UTF-8 encoded Unicode	ISO_IR 192 (Default)
Latin alphabet No. 1	ISO_IR 100
Latin alphabet No. 2	ISO_IR 101
Latin alphabet No. 3	ISO_IR 109
Latin alphabet No. 4	ISO_IR 110
Latin alphabet No. 5	ISO_IR 148
Cyrillic	ISO_IR 144
Arabic	ISO_IR 127
Greek	ISO_IR 126
Hebrew	ISO_IR 138
Japanese	ISO_IR 13
Thai	ISO_IR 166
Chinese	GB18030

Please note, configured Character Set will only come into effect if the remote Service Provider does not send it in the DICOM response. The latter would be a violation of the DICOM standard which now can be corrected by service personnel via Character Set configuration.

Configuration of Specific Character Sets can only be performed by a Service User (Table 4-34 Configuration Parameters Table).

If Specific Character Set is missing in the request or response data set and no Character Set is configured (settings is "None"), the IOLMaster 700 Application Software uses ISO\_IR 192 (UTF-8) as default.

Examples of when to use the optional configuration of specific character sets:

- A 3rd party MWL Provider sends responses with string values encoded in Latin alphabet No. 1 but does not provide corresponding Specific Character Set attribute. The MWL Character Set should be set to ISO\_IR 100 to ensure a proper decoding of the data set.
- A 3rd party Storage/Query/Retrieve Provider does only support DICOM instances with Specific Character Set ISO\_IR 100. The Storage/Query/Retrieve Character Set should be set to ISO\_IR 100 to ensure a proper encoding of the DICOM data set.
- Configuration of a Character Set is not needed if connected to FORUM Archive.



## 7 Security

The DICOM capabilities of the IOLMaster 700 Application Software do not support any specific security measures.

It is assumed that IOLMaster 700 Application Software 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 700 Application Software
- Firewall or router protections to ensure that IOLMaster 700 Application Software 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)

##### 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

The attribute value source is from User input

###### AUTO

The attribute value is generated automatically

###### MWL, MPPS, etc.

The attribute value is the same as the value received using a DICOM service such as Modality Worklist, Modality Performed Procedure Step, etc.

###### CONFIG

The attribute value source is a configurable parameter

###### ACQUISITION

The attribute value is generated from a data acquisition/measurement process

###### ANALYSIS

The attribute value is generated from a post-acquisition data analysis/calculation

###### PRQ

The attribute value is same as the value received using a DICOM service such as Patient Root Query.

##### 8.1.1.1 Encapsulated PDF Information Object Definition

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-1	ALWAYS
Study	General Study	Table 8-3	ALWAYS
Series	Encapsulated Document Series	Table 8-11	ALWAYS
Equipment	General Equipment	Table 8-8	ALWAYS
	SC Equipment	Table 8-12	ALWAYS
Encapsulated Document	Encapsulated Document	Table 8-13	ALWAYS
	SOP Common	Table 8-14	ALWAYS
	CZM Encapsulated Pdf Instance Extension	Table 8-15	Only if Reference Image acquisition has been performed.
	CZM IOL Measured Values	Table 8-16	ALWAYS

	CZM IOL Haigis-T	Table 8-17	Only if Toric IOL calculation has been performed.
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#### 8.1.1.2 Ophthalmic Photography 8 Bit Information Object Definition

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-1	ALWAYS
Study	General Study	Table 8-3	ALWAYS
Series	General Series	Table 8-6	ALWAYS
	Ophthalmic Photography Series	Table 8-18	ALWAYS
Frame Of Reference	Synchronization	Table 8-19	ALWAYS
Equipment	General Equipment	Table 8-8	ALWAYS
Image	General Image	Table 8-20	ALWAYS
	Image Pixel	Table 8-21	ALWAYS
	Cine	Table 8-23	ALWAYS
	Multi-frame	Table 8-24	ALWAYS
	Acquisition Context	Table 8-26	ALWAYS
	Ophthalmic Photography Image	Table 8-27	ALWAYS
	Ocular Region Imaged	Table 8-28	ALWAYS
	Ophthalmic Photography Acquisition Parameters	Table 8-29	ALWAYS
	Ophthalmic Photographic Parameters	Table 8-30	ALWAYS
	SOP Common	Table 8-32	ALWAYS

#### 8.1.1.3 Multi Frame Grayscale Byte Sc Image Information Object Definition

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-1	ALWAYS
Study	General Study	Table 8-3	ALWAYS
Series	General Series	Table 8-6	ALWAYS
Equipment	General Equipment	Table 8-8	ALWAYS
	Sc Equipment	Table 8-36	ALWAYS
Image	General Image	Table 8-37	ALWAYS
	Image Pixel	Table 8-38	ALWAYS
	Multi-frame	Table 8-40	ALWAYS
	Frame Pointers	Table 8-41	ALWAYS
	Sc Multi Frame Image	Table 8-47	ALWAYS

	Sc Multi Frame Vector	Table 8-48	ALWAYS
	Sop Common	Table 8-50	ALWAYS
	Czm Multi Frame Grayscale Byte Sc Image Extension	Table 8-52	ALWAYS

#### 8.1.1.4 Ophthalmic Axial Measurements Information Object Definition

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-1	ALWAYS
Study	General Study	Table 8-3	ALWAYS
Series	General Series	Table 8-6	ALWAYS
	Ophthalmic Axial Measurements Series	Table 8-53	ALWAYS
Equipment	General Equipment	Table 8-8	ALWAYS
	Enhanced General Equipment	Table 8-9	ALWAYS
Measurements	Ophthalmic Axial Measurements	Table 8-54	ALWAYS
	General Ophthalmic Refractive Measurements	Table 8-10	ALWAYS
	SOP Common	Table 8-55	ALWAYS
	CZM IOLM Clinical Patient Information	Table 8-56	Only if ophthalmic clinical patient information were acquired.

#### 8.1.1.5 Keratometry Measurements Information Object Definition

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-1	ALWAYS
Study	General Study	Table 8-3	ALWAYS
Series	General Series	Table 8-6	ALWAYS
	Keratometry Measurements Series	Table 8-57	ALWAYS
Equipment	General Equipment	Table 8-8	ALWAYS
	Enhanced General Equipment	Table 8-9	ALWAYS
Measurements	General Ophthalmic Refractive Measurements	Table 8-10	ALWAYS
	Keratometry Measurements	Table 8-58	ALWAYS
	Sop Common	Table 8-59	ALWAYS
	CZM IOLM Keratometry Quality	Table 8-60	Only if keratometry quality was acquired.
	CZM IOLM Posterior Cornea Surface Measurements	Table 8-61	Only if posterior cornea surface measurements were acquired. <i>Note: These values require are a separate software license, which might not yet be available in your country due to regulatory reasons.</i>

	CZM IOLM Total Keratometry Measurements	Table 8-62	Only if total keratometry measurements were acquired. <i>Note: These values require are a separate software license, which might not yet be available in your country due to regulatory reasons.</i>
	CZM IOLM Clinical Patient Information	Table 8-63	Only if ophthalmic clinical patient information were acquired.

#### 8.1.1.6 Intraocular Lens Calculations Information Object Definition

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-1	ALWAYS
Study	General Study	Table 8-3	ALWAYS
Series	General Series	Table 8-6	ALWAYS
	Intraocular Lens Calculations Series	Table 8-64	ALWAYS
Equipment	General Equipment	Table 8-8	ALWAYS
	Enhanced General Equipment	Table 8-9	ALWAYS
Measurements	Intraocular Lens Calculations	Table 8-65	ALWAYS
	General Ophthalmic Refractive Measurements	Table 8-10	ALWAYS
	Sop Common	Table 8-66	ALWAYS

### 8.1.1.7 Common Modules

**Table 8-1 Common Modules - Module "Patient"**

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name.	VNAP	MWL, PRQ, USER
(0010,0020)	2	LO	Patient ID	Primary hospital identification number or code for the patient.	ALWAYS	MWL, PRQ, USER
(0010,0021)	3	LO	Issuer of Patient ID	Identifier of the Assigning Authority (system, organization, agency, or department) that issued the Patient ID. Note: Equivalent to HL7 v2 CX component 4 subcomponent 1.	ANAP	MWL, PRQ, CONFIG
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the patient.	VNAP	MWL, PRQ, USER
(0010,0040)	2	CS	Patient's Sex	Sex of the named patient. Enumerated Values: M = male F = female O = other	VNAP	MWL, PRQ, USER
(0010,1000)	3	LO	Other Patient IDs	Other identification numbers or codes used to identify the patient.	ANAP	MWL, PRQ
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the patient.	ANAP	MWL, PRQ
(0010,4000)	3	LT	Patient Comments	User-defined additional information about the patient.	ANAP	MWL, PRQ

**Table 8-2 Common Modules - Module "General Study"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study.	ALWAYS	MWL, AUTO

(0008,0020)	2	DA	Study Date	In unscheduled case IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.1.1.1.1." followed by a date/time stamp and machine specific identifier. In scheduled case the value is copied from the Modality Worklist.		
(0008,0030)	2	TM	Study Time	Date the Study started.	ALWAYS	AUTO
(0008,0090)	2	PN	Referring Physician's Name	Time the Study started.	ALWAYS	AUTO
(0020,0010)	2	SH	Study ID	Name of the patient's referring physician.	VNAP	MWL
(0008,0050)	2	SH	Accession Number	User or equipment generated Study identifier. In scheduled case the source attribute for this value is Requested Procedure ID. In unscheduled case the value is an Equipment generated Study identifier.	ALWAYS	MWL, AUTO
(0008,1030)	3	LO	Study Description	A RIS generated number that identifies the order for the Study. Value does not exist in unscheduled case.	VNAP	MWL
(0008,1110)	3	SQ	Referenced Study Sequence	Institution-generated description or classification of the Study (component) performed. In scheduled case the source attribute for this value is Requested Procedure Description. Value does not exist in unscheduled case.	ANAP	MWL
>(0008,1150)	1	UI	Referenced SOP Class UID	A sequence that provides reference to a Study SOP Class/Instance pair. The sequence may have zero or more Items.	ANAP	MWL
>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Class.	ALWAYS	MWL
(0008,1032)	3	SQ	Procedure Code Sequence	Uniquely identifies the referenced SOP Instance.  A Sequence that conveys the type of procedure performed. One or more Items may be included in this Sequence. Attribute does not exist in unscheduled case.	ALWAYS	MWL
>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1.	ANAP	MWL
>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2.	ALWAYS	MWL
>(0008,0103)	1C	SH	Coding Scheme Version	Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	ALWAYS	MWL

>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3.	ALWAYS	MWL
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**Table 8-3 Common Modules - Module "General Series"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.11.1.2." followed by a date/time stamp and a machine specific identifier.	ALWAYS	AUTO
(0020,0011)	2	IS	Series Number	A number that identifies this Series.	ALWAYS	AUTO
(0008,0021)	3	DA	Series Date	Date the Series started.	ALWAYS	AUTO
(0008,0031)	3	TM	Series Time	Time the Series started.	ALWAYS	AUTO
(0018,0015)	3	CS	Body Part Examined	Text description of the part of the body examined. See PS 3.16 Annexes on Correspondence of Anatomic Region Codes and Body Part Examined for Humans and for Animals for Defined Terms Note: Some IODs support the Anatomic Region Sequence (0008,2218), which can provide a more comprehensive mechanism for specifying the body part being examined.  Always "EYE"	ALWAYS	AUTO
(0040,0275)	3	SQ	Request Attributes Sequence	Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items. The Request Attributes Sequence is only included in Scheduled Case.	ANAP	MWL
>(0040,1001)	1C	SH	Requested Procedure ID	Identifier that identifies the Requested Procedure in the Imaging Service Request. Required if procedure was scheduled. May be present otherwise. Note: The condition is to allow the contents of this macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.	ALWAYS	MWL
>(0032,1060)	3	LO	Requested Procedure Description	Institution-generated administrative description or classification of Requested Procedure.	ANAP	MWL



>(0032,1064)	3	SQ	Requested Procedure Code Sequence	A sequence that conveys the Procedure Type of the requested procedure. Only a single Item is permitted in this sequence.	ANAP	MWL
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1.	ALWAYS	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2.	ALWAYS	MWL
>>(0008,0103)	1C	SH	Coding Scheme Version	See NEMA PS3.3 Section 8.2. Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously. May be present otherwise.	ANAP	MWL
>>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3.	ALWAYS	MWL
>(0040,0009)	1C	SH	Scheduled Procedure Step ID	Identifier that identifies the Scheduled Procedure Step. Required if procedure was scheduled. Note: The condition is to allow the contents of this macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure step was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.	ALWAYS	MWL
>(0040,0007)	3	LO	Scheduled Procedure Step Description	Institution-generated description or classification of the Scheduled Procedure Step to be performed.	ANAP	MWL
>(0040,0008)	3	SQ	Scheduled Protocol Code Sequence	Sequence describing the Scheduled Protocol following a specific coding scheme. One or more Items are permitted in this sequence.	ANAP	MWL
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1.	ALWAYS	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2.	ALWAYS	MWL
>>(0008,0103)	1C	SH	Coding Scheme Version	See NEMA PS3.3 Section 8.2. Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously. May be present otherwise.	ANAP	MWL
>>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3.	ALWAYS	MWL
(0040,0253)	3	SH	Performed Procedure Step ID	User or equipment generated identifier of that part of a Procedure that has been carried out within this step. All instances created for a single IOLMaster 700 measurement share the same value for Performed Procedure Step ID.	ALWAYS	AUTO

(0040,0244)	3	DA	Performed Procedure Step Start Date	Date on which the Performed Procedure Step started.	ALWAYS	AUTO
(0040,0245)	3	TM	Performed Procedure Step Start Time	Time on which the Performed Procedure Step started.	ALWAYS	AUTO
(0040,0254)	3	LO	Performed Procedure Step Description	Institution-generated description or classification of the Procedure Step that was performed. Always "Ophthalmic Biometry Measurement".	ALWAYS	AUTO

**Table 8-4 Common Modules - Module "General Equipment"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0070)	2	LO	Manufacturer	Manufacturer of the equipment that produced the composite instances Always "Carl Zeiss Meditec"	ALWAYS	AUTO
(0008,0080)	3	LO	Institution Name	Institution where the equipment that produced the composite instances is located. Attribute does not exist if no Institution Name is configured.	ANAP	CONFIG
(0008,0081)	3	ST	Institution Address	Mailing address of the institution where the equipment that produced the composite instances is located. Attribute does not exist if no Institution Address is configured.	ANAP	CONFIG
(0008,1010)	3	SH	Station Name	User defined name identifying the machine that produced the composite instances. Attribute does not exist if no Station Name is configured.	ANAP	CONFIG
(0008,1040)	3	LO	Institutional Department Name	Department in the institution where the equipment that produced the composite instances is located. Attribute does not exist if no Institutional Department Name is configured.	ANAP	CONFIG
(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the composite instances. Always "IOLMaster 700"	ALWAYS	AUTO
(0018,1000)	3	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	ALWAYS	AUTO

					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.		
(0018,1020)	3	LO	Software Version(s)		Manufacturer's designation of software version of the equipment that produced the composite instances. "1.90.6.54\C87103" higher versions: "1.90.xx.yyyy\Czzzzz" where xx denotes a patch version, yyyy denotes a build version, zzzzz denotes a vendor specific identifier	ALWAYS	AUTO

**Table 8-5 Common Modules - Module "Enhanced General Equipment"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0070)	1	LO	Manufacturer	Manufacturer of the equipment that produced the composite instances.  Always "Carl Zeiss Meditec"	ALWAYS	AUTO
(0008,1090)	1	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the composite instances.  Always "IOLMaster 700"	ALWAYS	AUTO
(0018,1000)	1	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)	1	LO	Software Version(s)	Manufacturer's designation of software version of the equipment that produced the composite instances. "1.90.6.54\C87103" higher versions: "1.90.xx.yyyy\Czzzzz" where xx denotes a patch version, yyyy denotes a build version, zzzzz denotes a vendor specific identifier	ALWAYS	AUTO

**Table 8-6 Common Modules - Module "General Ophthalmic Refractive Measurements"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,0013)	1	IS	Instance Number	A number that identifies these measurements.	ALWAYS	AUTO
(0008,0023)	1	DA	Content Date	The date the measurements data creation started.	ALWAYS	AUTO
(0008,0033)	1	TM	Content Time	The time the measurements data creation started.	ALWAYS	AUTO
(0024,0113)	3	CS	Measurement Laterality	Laterality of refractive measurement performed.	ALWAYS	AUTO
				Enumerated Values: R - right L - left B - both left and right together		
				Note Laterality (0020,0060) is a Series level Attribute and must be the same for all Measurements in the Series, hence it must be absent if multiple instances from different eyes or lenses are encoded.		
(0020,4000)	3	LT	Image Comments	Needs to be consistent with any other laterality information contained at the Measurement level.	ANAP	USER, AUTO
				User-defined comments about the image as well as localized equipment generated warnings regarding validation results for the performed measurement.		

### 8.1.1.8 Encapsulated PDF Modules

**Table 8-7 Encapsulated PDF IOD - Module "Encapsulated Document Series"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0060)	1	CS	Modality	The modality appropriate for the encapsulated document. This Type definition shall override the definition in the SC Equipment Module.  Always "OAM"	ALWAYS	AUTO
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series.  IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.11.1.2." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
(0020,0011)	1	IS	Series Number	A number that identifies the Series.	ALWAYS	AUTO
(0040,0275)	3	SQ	Request Attributes Sequence	Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items. The Request Attributes Sequence is only included in Scheduled Case.	ANAP	MWL
>(0040,1001)	1C	SH	Requested Procedure ID	Identifier that identifies the Requested Procedure in the Imaging Service Request. Required if procedure was scheduled. May be present otherwise. Note: The condition is to allow the contents of this macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.	ALWAYS	MWL
>(0032,1060)	3	LO	Requested Procedure Description	Institution-generated administrative description or classification of Requested Procedure.	ANAP	MWL
>(0032,1064)	3	SQ	Requested Procedure Code Sequence	A sequence that conveys the Procedure Type of the requested procedure. The Requested Procedure Code Sequence shall contain only a single item.	ANAP	MWL
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1.	ALWAYS	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2.	ALWAYS	MWL

>>(0008,0103)	1C	SH	Coding Scheme Version	See NEMA PS3.3 Section 8.2. Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously. May be present otherwise.	ANAP	MWL
>>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3.	ALWAYS	MWL
>(0040,0009)	1C	SH	Scheduled Procedure Step ID	Identifier that identifies the Scheduled Procedure Step. Required if procedure was scheduled. Note: The condition is to allow the contents of this macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure step was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.	ALWAYS	MWL
>(0040,0007)	3	LO	Scheduled Procedure Step Description	Institution-generated description or classification of the Scheduled Procedure Step to be performed.	ANAP	MWL
>(0040,0008)	3	SQ	Scheduled Protocol Code Sequence	Sequence describing the Scheduled Protocol following a specific coding scheme. This sequence contains one or more Items.	ANAP	MWL
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1.	ALWAYS	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2.	ALWAYS	MWL
>>(0008,0103)	1C	SH	Coding Scheme Version	See NEMA PS3.3 Section 8.2. Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously. May be present otherwise.	ANAP	MWL
>>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3.	ALWAYS	MWL
(0040,0253)	3	SH	Performed Procedure Step ID	User or equipment generated identifier of that part of a Procedure that has been carried out within this step. All instances created for a single IOLMaster 700 measurement share the same value for Performed Procedure Step ID.	ALWAYS	AUTO
(0040,0244)	3	DA	Performed Procedure Step Start Date	Date on which the Performed Procedure Step started.	ALWAYS	AUTO
(0040,0245)	3	TM	Performed Procedure Step Start Time	Time on which the Performed Procedure Step started.	ALWAYS	AUTO
(0040,0254)	3	LO	Performed Procedure Step Description	Institution-generated description or classification of the Procedure Step that was performed. Always "Ophthalmic Biometry Measurement".	ALWAYS	AUTO

**Table 8-8 Encapsulated PDF IOD - Module "SC Equipment"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0064)	1	CS	Conversion Type	Describes the kind of image conversion. Defined Terms : DV = Digitized Video DI = Digital Interface DF = Digitized Film WSD = Workstation SD = Scanned Document SI = Scanned Image DRW = Drawing SYN = Synthetic Image	ALWAYS	AUTO
				Always "SYN" for Synthetic Image		

**Table 8-9 Encapsulated PDF IOD - Module "Encapsulated Document"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,0013)	1	IS	Instance Number	A number that identifies this SOP Instance. The value shall be unique within a series.	ALWAYS	AUTO
(0008,0023)	2	DA	Content Date	The date the document content creation was started.	ALWAYS	AUTO
(0008,0033)	2	TM	Content Time	The time the document content creation was started.	ALWAYS	AUTO
(0008,002A)	2	DT	Acquisition Datetime	The date and time that the original generation of the data in the document started.	ALWAYS	AUTO
(0020,0062)	3		Image Laterality	Laterality of the (possibly paired) body part that is the subject of the encapsulated document. Enumerated Values: R = right L = left B = both left and right	ALWAYS	AUTO
(0028,0301)	1	CS	Burned In Annotation	Indicates whether or not the encapsulated document contains sufficient burned in annotation to identify the patient and date the data was acquired. Enumerated Values: YES NO Identification of patient and date as text in an encapsulated document (e.g., in an XML attribute or element) is equivalent to "burned in annotation". A de-identified document may use the value NO. Always "YES"	ALWAYS	AUTO
(0042,0013)	1C	SQ	Source Instance Sequence	A sequence that identifies the set of Instances that were used to derive the encapsulated document. One or more Items may be included in this Sequence. Required if derived from one or more DICOM Instances. May be present otherwise.	ANAP	AUTO

				Attribute exists if there are any instances related to this encapsulated document.		
>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class.	ALWAYS	AUTO
>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO
(0042,0010)	2	ST	Document Title	The title of the document. Note: In the case of a PDF encapsulated document, this may be the value of the "Title" entry in the "Document Information Directory" as encoded in the PDF data. Always "IOLMaster 700 Report"	ALWAYS	AUTO
(0040,A043)	2	SQ	Concept Name Code Sequence	A coded representation of the document title. Zero or one item may be present. Always empty sequence	EMPTY	AUTO
(0042,0012)	1	LO	MIME Type of Encapsulated Document	The type of the encapsulated document stream described using the MIME Media Type (see RFC 2046). Always "application/pdf"	ALWAYS	AUTO
(0042,0011)	1	OB	Encapsulated Document	Encapsulated Document stream, containing a document encoded according to the MIME Type.	ALWAYS	AUTO

**Table 8-10 Encapsulated PDF IOD - Module "SOP Common"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. See C.12.1.1.1 for further explanation. See also PS 3.4.  Always "1.2.840.10008.5.1.4.1.1.104.1"	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS 3.4.  IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.11.1.3." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO



(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See PS3.3 C.12.1.1.2 for Defined Terms.	ALWAYS	AUTO, CONFIG
(0008,0012)	3	DA	Instance Creation Date	See 6 Support of Character Sets. Date the SOP Instance was created.	ALWAYS	AUTO
(0008,0013)	3	TM	Instance Creation Time	Time the SOP Instance was created.	ALWAYS	AUTO
(0018,A001)	3	SQ	Contributing Equipment Sequence	Sequence of Items containing descriptive attributes of related equipment which has contributed to the acquisition, creation or modification of the composite instance. One or more Items may be included in this Sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation. Sequence contains one single item defining the equipment which originally acquired the measurement data.	ALWAYS	AUTO
>(0040,A170)	1	SQ	Purpose of Reference Code Sequence	Describes the purpose for which the related equipment is being reference. Only a single Item shall be permitted in this sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1. Always "109101"	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Always "DCM"	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3. Always "Acquisition Equipment"	ALWAYS	AUTO
>(0008,0070)	1	LO	Manufacturer	Manufacturer of the equipment that contributed to the composite instance. Always "Carl Zeiss Meditec"	ALWAYS	AUTO
>(0008,0080)	3	LO	Institution Name	Institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Name is defined for contributing equipment.	ANAP	AUTO
>(0008,0081)	3	ST	Institution Address	Address of the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Address is defined for contributing equipment.	ANAP	AUTO
>(0008,1010)	3	SH	Station Name	User defined name identifying the machine that contributed to the composite instance.	ANAP	AUTO

				Attribute does not exist if no Station Name is defined for contributing equipment.		
>(0008,1040)	3	LO	Institutional Department Name	Department in the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institutional Department Name is defined for contributing equipment.	ANAP	AUTO
>(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that contributed to the composite instance. Attribute does not exist if no Manufacturer's Model Name is defined for contributing equipment.	ANAP	AUTO
>(0018,1000)	3	LO	Device Serial Number	Manufacturer's serial number of the equipment that contributed to the composite instance. Attribute does not exist if no Device Serial Number is defined for contributing equipment.	ANAP	AUTO
>(0018,1020)	3	LO	Software Version(s)	Manufacturer's designation of the software version of the equipment that contributed to the composite instance. Attribute does not exist if no Software Version(s) is defined for contributing equipment.	ANAP	AUTO
>(0018,1200)	3	DA	Date of Last Calibration	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Date of Last Calibration is defined for contributing equipment.	ANAP	AUTO
>(0018,1201)	3	TM	Time of Last Calibration	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Time of Last Calibration is defined for contributing equipment.	ANAP	AUTO

**Table 8-11 Encapsulated PDF IOD - Module "CZM Encapsulated Pdf Instance Extension"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,4000)	3	LT	Image Comments	User-defined comments about the image as well as localized equipment generated warnings regarding validation results for the performed measurement.	ANAP	USER, AUTO
(0008,1140)	3	SQ	Referenced Image Sequence	References images that are important for IOLs. The sequence may contain zero, one or more items. Only present if Reference Image acquisition has been performed. References OP dataset containing scleral images.	ANAP	AUTO
>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class.	ALWAYS	AUTO

				Always "1.2.840.10008.5.1.4.1.1.77.1.5.1"		
>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. SOP Instance UID of the referenced OP dataset.	ALWAYS	AUTO
>(0040,A170)	3	SQ	Purpose of Reference Code Sequence	Describes the purpose for which the reference is made. Only a single item is permitted in this sequence.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-90 Coded Values - Referenced Image Purposes of Reference	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-90 Coded Values - Referenced Image Purposes of Reference	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-90 Coded Values - Referenced Image Purposes of Reference	ALWAYS	AUTO

**Table 8-12 Encapsulated PDF IOD - Module "CZM IOL Measured Values"**

Tag	Type	VR	Name	Description	PoV	Source
(771B,00xx)	3	LO	Private Creator	99CZM	ALWAYS	AUTO
(771B,xx30)	3	SQ	Axial Length Values Sequence	Sequence of axial length values measured for one eye, may contain 1 or 2 items Sequence only exists if axial length values have been acquired.	ANAP	AUTO
>(771B,xx08)	3	CS	IOL Laterality	Laterality R = right, L = left	ALWAYS	AUTO
>(771B,xx31)	3	SQ	Axial Length Values Triple Sequence	Sequence of single axial length measurements, may contain up to 6 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 "1.0" for compatibility reasons.	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]	ANAP	AUTO

					Attribute only exists if composite value could be calculated.			
>(771B,xx44)	3	FD	Mean Value SNR		Signal to noise ratio (composite value) Attribute only exists if composite value could be calculated.	ANAP		AUTO
(771B,xx32)	3	SQ	Keratometer Values Sequence		Sequence of keratometry values measured for one eye, may contain 1 or 2 items Sequence only exists if keratometry values have been acquired.	ANAP		AUTO
>(771B,xx08)	3	CS	IOL Laterality		Laterality R = right, L = left	ALWAYS		AUTO
>(771B,xx33)	3	SQ	Keratometer Values n-Tupel 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 Attribute only exists if composite value could be calculated.	ANAP		AUTO
>(771B,xx49)	3	FD	Mean Value R1		Mean value of radius in flat meridian [mm] Attribute only exists if composite value could be calculated.	ANAP		AUTO
>(771B,xx4A)	3	FD	Mean Value D1		Mean value of power in flat meridian [dpt] Attribute only exists if composite value could be calculated.	ANAP		AUTO
>(771B,xx4B)	3	FD	Mean Value A1		Mean value of axis of flat meridian [°] Attribute only exists if composite value could be calculated.	ANAP		AUTO

>(771B,xx4C)	3	FD	Mean Value R2	Mean value of radius in steep meridian [mm] Attribute only exists if composite value could be calculated.	ANAP	AUTO
>(771B,xx4D)	3	FD	Mean Value D2	Mean value of power in steep meridian [dpt] Attribute only exists if composite value could be calculated.	ANAP	AUTO
>(771B,xx4E)	3	FD	Mean Value A2	Mean value of axis of steep meridian [°] Attribute only exists if composite value could be calculated.	ANAP	AUTO
>(771B,xx4F)	3	FD	Mean Value ZyI	Mean value of difference between steep and flat keratometric power [dpt] Attribute only exists if composite value could be calculated.	ANAP	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 Sequence only exists if chamber depth values have been acquired.	ANAP	AUTO
>(771B,xx08)	3	CS	IOL Laterality	Laterality R = right, L = left	ALWAYS	AUTO
>(771B,xx18)	3	FD	Num1	Measurement 1 of anterior chamber depth [mm] Attribute only exists if chamber depth has been acquired.	ANAP	AUTO
>(771B,xx19)	3	FD	Num2	Measurement 2 of anterior chamber depth [mm] Attribute only exists if chamber depth has been acquired.	ANAP	AUTO
>(771B,xx1A)	3	FD	Num3	Measurement 3 of anterior chamber depth [mm] Attribute only exists if chamber depth has been acquired.	ANAP	AUTO
>(771B,xx1B)	3	FD	Num4	Measurement 4 of anterior chamber depth [mm] Attribute only exists if chamber depth has been acquired.	ANAP	AUTO
>(771B,xx1C)	3	FD	Num5	Measurement 5 of anterior chamber depth [mm] Attribute only exists if chamber depth has been acquired.	ANAP	AUTO
>(771B,xx0E)	3	FD	Mean Value	Mean value of anterior chamber depth [mm] Attribute only exists if composite value could be calculated.	ANAP	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 Sequence only exists if white-to-white values have been acquired.	ANAP	AUTO
>(771B,xx08)	3	CS	IOL Laterality	Laterality	ALWAYS	AUTO

				R = right, L = left		
>(771B,xx3B)	3	SQ	White-to-white Values Sequence	Sequence of single white-to-white measurements, contains one item	ALWAYS	AUTO
>>(771B,xx1D)	3	FD	Wzw	White-to-white diameter [mm] Attribute only exists if white-to-white value has been acquired.	ANAP	AUTO
>>(771B,xx1E)	3	FD	Fpx	Horizontal offset of the white-to-white center to the fixation point / visual axis (x-coordinate) [mm] Attribute only exists if white-to-white value has been acquired.	ANAP	AUTO
>>(771B,xx1F)	3	FD	Fpy	Vertical offset of the white-to-white center to the fixation point / visual axis (y-coordinate) [mm] Attribute only exists if white-to-white value has been acquired.	ANAP	AUTO
>>(771B,xx50)	3	FD	Pup	Pupil diameter [mm] Attribute only exists if white-to-white value has been acquired.	ANAP	AUTO
>>(771B,xx51)	3	FD	Pup Fpx	Horizontal offset of the pupil center to the fixation point / visual axis (x-coordinate) [mm] Attribute only exists if white-to-white value has been acquired.	ANAP	AUTO
>>(771B,xx52)	3	FD	Pup Fpy	Vertical offset of the pupil center to the fixation point / visual axis (y-coordinate) [mm] Attribute only exists if white-to-white value has been acquired.	ANAP	AUTO

**Table 8-13 Encapsulated PDF IOD - Module "CZM IOL Haigis-T"**

Tag	Type	VR	Name	Description	PoV	Source
(771B,xx60)	3	SQ	Haigis-T Sequence	Sequence of toric IOL calculations Only present if toric IOL calculation has been performed.	ANAP	AUTO
>(771B,xx09)	3	LO	Formula Denominator	Name of formula "Haigis Suite" if Haigis Suite formula was used. "Barrett Suite" if Barrett Suite formula was used. "Mixed Toric" if Haigis Suite formula was used for one and Barrett Toric formula was used for the other eye.	ALWAYS	AUTO
>(771B,xx2C)	3	LO	Surgeon	Name of surgeon	ALWAYS	USER

>(771B,xx61)	3	SQ	Haigis-T Formula Sequence	Sequence of toric IOL calculations for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>>(771B,xx08)	3	CS	IOL Laterality	Laterality R = right, L = left	ALWAYS	AUTO
>>(771B,xx62)	3	SQ	Surgical Conditions Sequence	Sequence of general surgical conditions and parameters relevant to toric IOL calculations for one single eye. Contains only one item.	ALWAYS	AUTO
>>>(771B,xx63)	3	FD	SIA Cylinder	Cylinder of surgically induced astigmatism [dpt]	ALWAYS	USER
>>>(771B,xx64)	3	FD	SIA Axis	Axis of surgically induced astigmatism [°]	ALWAYS	USER
>>>(771B,xx65)	3	FD	Toric IOL Axis	Toric IOL implantation axis in plus-cylinder notation [°]	ALWAYS	AUTO

### 8.1.1.9 Ophthalmic Photography 8 Bit Modules

**Table 8-14 Ophthalmic Photography IOD - Module "Ophthalmic Photography Series"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0060)	1	CS	Modality	Source equipment that produced the Ophthalmic Photography Series. Enumerated Value: OP  Always "OP"	ALWAYS	AUTO

**Table 8-15 Ophthalmic Photography IOD - Module "Synchronization"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,0200)	1	UI	Synchronization Frame of Reference UID	UID of common synchronization environment. See C.7.4.2.1.1. IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.1.1.5" followed by a date/time stamp and a machine specific identifier.	ALWAYS	AUTO
(0018,106A)	1	CS	Synchronization Trigger	Data acquisition synchronization with external equipment Enumerated Values: SOURCE - this equipment provides synchronization channel or trigger to other equipment EXTERNAL - this equipment receives synchronization channel or trigger from other equipment PASSTHRU - this equipment receives synchronization channel or trigger and forwards it NO TRIGGER - data acquisition not synchronized by common channel or trigger.  Always "NO TRIGGER"	ALWAYS	AUTO
(0018,1800)	1	CS	Acquisition Time Synchronized	Acquisition Date Time (0008,002A) synchronized with external time reference. Enumerated Values: Y, N See C.7.4.2.1.4  Always "N"	ALWAYS	AUTO

**Table 8-16 Ophthalmic Photography IOD - Module "General Image"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,0020)	2C	CS	Patient Orientation	Patient direction of the rows and columns of the image. Required if image does not require Image Orientation (Patient) (0020,0037) and Image Position (Patient) (0020,0032). May be	ALWAYS	AUTO



				present otherwise. See C.7.6.1.1.1 for further explanation. Note: IOD's may have attributes other than Patient Orientation, Image Orientation, or Image Position (Patient) to describe orientation in which case this attribute will be zero length.		
(0020,4000)	3	LT	Image Comments	Always "LF" User-defined comments about the image as well as localized equipment generated warnings regarding validation results for the performed measurement.	ANAP	USER, AUTO

**Table 8-17 Ophthalmic Photography IOD - Module "Image Pixel"**

Tag	Type	VR	Name	Description	PoV	Source
(0028,0010)	1	US	Rows	Number of rows in the image.	ALWAYS	AUTO
(0028,0011)	1	US	Columns	Number of columns in the image	ALWAYS	AUTO
(0028,0100)	1	US	Bits Allocated	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. See PS 3.5 for further explanation.  Always "8"	ALWAYS	AUTO
(0028,0101)	1	US	Bits Stored	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored. See PS 3.5 for further explanation.  Always "8"	ALWAYS	AUTO
(0028,0102)	1	US	High Bit	Most significant bit for pixel sample data. Each sample shall have the same high bit. See PS 3.5 for further explanation.  Always "7"	ALWAYS	AUTO
(7FE0,0010)	1C	OB JO W	Pixel Data	A data stream of the pixel samples that comprise the Image. See C.7.6.3.1.4 for further explanation. Required if Pixel Data Provider URL (0028,7FE0) is not present.	ALWAYS	ACQUISIT ION

**Table 8-18 Ophthalmic Photography IOD - Module "Cine"**

Tag	Type	VR	Name	Description	PoV	Source
(0018,1063)	1C	DS	Frame Time	Nominal time (in msec) per individual frame. See C.7.6.5.1.1 for further explanation. Required if Frame Increment Pointer (0028,0009) points to Frame Time.  Always "0"	ALWAYS	AUTO

**Table 8-19 Ophthalmic Photography IOD - Module "Multi-frame"**

Tag	Type	VR	Name	Description	PoV	Source
(0028,0008)	1	IS	Number of Frames	Number of frames in a Multi-frame Image. See C.7.6.6.1.1 for further explanation.  Always "1"	ALWAYS	AUTO
(0028,0009)	1	AT	Frame Increment Pointer	Contains the Data Element Tag of the attribute that is used as the frame increment in Multi-frame pixel data. See C.7.6.6.1.2 for further explanation.  Always "(0018,1063)" for Frame Time	ALWAYS	AUTO

**Table 8-20 Ophthalmic Photography IOD - Module "Acquisition Context"**

Tag	Type	VR	Name	Description	PoV	Source
(0040,0555)	2	SQ	Acquisition Context Sequence	A sequence of Items that describes the conditions present during the acquisition of the data of the SOP Instance. Zero or more items shall be included in this sequence. This sequence is used by IOLMaster 700 to provide additional measurement values and conditions for acquired sclera images and white-to-white images.	ALWAYS	AUTO
>(0040,A040)	3	CS	Value Type	The type of the value encoded in this Item. Defined Terms: TEXT NUMERIC CODE DATE TIME PNAME See NEMA PS3.3 Section 10.2.	ALWAYS	AUTO
>(0040,A043)	1	SQ	Concept Name Code Sequence	A concept that constrains the meaning of (i.e. defines the role of) the Observation Value. The "Name" component of a Name/Value pair. Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates	ALWAYS	AUTO

				Sclera reference images: See Table 8-91 Coded Values - Acquisition Context Sequence – Sclera images White-to-white images: See Table 8-92 Coded Values - Acquisition Context Sequence – White-to-white images		
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates Sclera reference images: See Table 8-91 Coded Values - Acquisition Context Sequence – Sclera images White-to-white images: See Table 8-92 Coded Values - Acquisition Context Sequence – White-to-white images	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates Sclera reference images: See Table 8-91 Coded Values - Acquisition Context Sequence – Sclera images White-to-white images: See Table 8-92 Coded Values - Acquisition Context Sequence – White-to-white images	ALWAYS	AUTO
>(0040,A30A)	1C	DS	Numeric Value	This is the Value component of a Name/Value pair when the Concept implied by Concept Name Code Sequence (0040,A043) is a set of one or more numeric values. Required if the value that Concept Name Code Sequence (0040,A043) requires (implies) is a set of one or more integers or real numbers. Shall not be present otherwise.	ANAP	AUTO
>(0040,08EA)	1C	SQ	Measurement Units Code Sequence	Units of measurement. Only a single Item shall be included in this Sequence. Required if Numeric Value (0040,A30A) is sent. Shall not be present otherwise.	ANAP	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates Sclera reference images: See Table 8-91 Coded Values - Acquisition Context Sequence – Sclera images White-to-white images: See Table 8-92 Coded Values - Acquisition Context Sequence – White-to-white images	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates Sclera reference images: See Table 8-91 Coded Values - Acquisition Context Sequence – Sclera images White-to-white images: See Table 8-92 Coded Values - Acquisition Context Sequence – White-to-white images	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates	ALWAYS	AUTO

				Sclera reference images: See Table 8-91 Coded Values - Acquisition Context Sequence – Sclera images White-to-white images: See Table 8-92 Coded Values - Acquisition Context Sequence – White-to-white images	
>(0040,A160)	1C	UT	Text Value	This is the Value component of a Name/Value pair when the Concept implied by Concept Name Code Sequence (0040,A043) is a Text Observation Value. Required if Date (0040,A121), Time (0040,A122), and Person Name (0040,A123) do not fully describe the concept specified by Concept Name Code Sequence (0040,A043). Shall not be present otherwise.	ANAP  AUTO

**Table 8-21 Ophthalmic Photography IOD - Module "Ophthalmic Photography Image"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0008)	1	CS	Image Type	Image identification characteristics. See C.8.17.2.1.4 for specialization.  For sclera reference images always "ORIGINAL\PRIMARY\SCLERA" For white-to-white images always "ORIGINAL\PRIMARY\WHITE_TO_WHITE"	ALWAYS	AUTO
(0020,0013)	1	IS	Instance Number	A number that identifies this image.	ALWAYS	AUTO
(0028,0002)	1	US	Samples per Pixel	Number of samples (planes) in this image. Enumerated values: 1 or 3. See C.8.17.2.1.2 for further explanation.  Always "1"	ALWAYS	AUTO
(0028,0004)	1	CS	Photometric Interpretation	Specifies the intended interpretation of the pixel data. See NEMA PS3.3 Section C.8.17.2.1.3  Always "MONOCHROME2"	ALWAYS	AUTO
(0028,0103)	1	US	Pixel Representation	Data representation of the pixel samples. Enumerated value: 0  Always "0"	ALWAYS	AUTO
(0028,0030)	1C	DS	Pixel Spacing	Nominal physical distance at the focal plane (in the retina) between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. See 10.7.1.3 for further explanation of the value order. Note: These values are	ALWAYS	AUTO

				specified as nominal because the physical distance may vary across the field of the images and the lens correction is likely to be imperfect. Required when Acquisition Device Type Code Sequence (0022,0015) contains an item with the value (SRT, R-1021A, "Fundus Camera"). May be present otherwise.		
(0008,0033)	1	TM	Content Time	Multi-value attribute containing 2 values: 1) adjacent row spacing in mm 2) adjacent column spacing in mm	ALWAYS	AUTO
(0008,0023)	1	DA	Content Date	The time the image pixel data creation started.	ALWAYS	AUTO
(0008,002A)	1C	DT	Acquisition Datetime	The date and time that the acquisition of data started. Note: The synchronization of this time with an external clock is specified in the synchronization Module in Acquisition Time Synchronized (0018,1800). Required if Image Type (0008,0008) Value 1 is ORIGINAL. May be present otherwise.	ALWAYS	AUTO
(0028,2110)	1	CS	Lossy Image Compression	Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression. See NEMA PS3.3 C.7.6.1.1.5  Always "01"	ALWAYS	AUTO
(0028,2112)	1C	DS	Lossy Image Compression Ratio	Describes the approximate lossy compression ratio(s) that have been applied to this image. See NEMA PS3.3 C.7.6.1.1.5 for further explanation. May be multivalued if successive lossy compression steps have been applied. Notes: 1. For example, a compression ratio of 30:1 would be described in this Attribute with a single value of 30. 2. For historical reasons, the lossy compression ratio should also be described in Derivation Description (0008,2111) Required if Lossy Image Compression (0028,2110) has a value of "01".	ALWAYS	AUTO
(0028,2114)	1C	CS	Lossy Image Compression Method	A label for the lossy compression method(s) that have been applied to this image. See NEMA PS3.3 C.7.6.1.1.5 for further explanation. May be multivalued if successive lossy compression steps have been applied; the value order shall correspond to the values of Lossy Image Compression Ratio (0028,2112). Required if Lossy Image Compression (0028,2110) has a value of "01". Note: For historical reasons, the lossy compression method should also be described in Derivation Description (0008,2111).  Always "ISO_10918_1"	ALWAYS	AUTO

(0050,0020)	1C	CS	Presentation LUT Shape	Specifies an identity transformation for the Presentation LUT, such that the output of all grayscale transformations defined in the IOD containing this Module are defined to be P-Values. Enumerated Values: IDENTITY - output is in P-Values. Required if Photometric Interpretation (0028,0004) is MONOCHROME2  Always "IDENTITY"	ALWAYS	AUTO
(0028,0301)	1	CS	Burned In Annotation	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. Enumerated Value: YES NO  Always "NO"	ALWAYS	AUTO

**Table 8-22 Ophthalmic Photography IOD - Module "Ocular Region Imaged"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,0062)	1	CS	Image Laterality	Laterality of object imaged (as described in Anatomic Region Sequence (0008,2218)) examined. Enumerated Values: R = right eye L = left eye B = both left and right eye Shall be consistent with any laterality information contained in Primary Anatomic Structure Modifier Sequence (0008,2230), if present. Note: Laterality (0020,0060) is a Series level Attribute and must be the same for all Images in the Series. Since most Ophthalmic Photographic Image studies contain images of both eyes, the series level attribute will rarely be present.  Always "L" or "R" depending on the eye examined	ALWAYS	AUTO
(0008,2218)	1	SQ	Anatomic Region Sequence	Sequence that identifies the anatomic region of interest in this Instance (i.e. external anatomy, surface anatomy, or general region of the body). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>(0008,0100)	1	SH	Code Value	Always "T-AA000"	ALWAYS	AUTO
>(0008,0102)	1	SH	Coding Scheme Designator	Always "SRT"	ALWAYS	AUTO
>(0008,0104)	1	LO	Code Meaning	Always "Eye"	ALWAYS	AUTO

**Table 8-23 Ophthalmic Photography IOD - Module "Ophthalmic Photography Acquisition Parameters"**

Tag	Type	VR	Name	Description	PoV	Source
(0022,0005)	2	CS	Patient Eye Movement Commanded	Always empty	EMPTY	AUTO
(0022,000C)	2	FL	Horizontal Field of View	The horizontal field of view in degrees	EMPTY	AUTO
(0022,001B)	2	SQ	Refractive State Sequence	The refractive state of the imaged eye at the time of acquisition. Zero or one Item shall be included in this sequence. Zero length means the refractive state was not measured. Always empty sequence	EMPTY	AUTO
(0022,000A)	2	FL	Emmetropic Magnification	Emmetropic magnification value (dimensionless). Zero length means the emmetropic magnification was not measured. Always empty	EMPTY	AUTO
(0022,000B)	2	FL	Intra Ocular Pressure	Value of intraocular pressure in mmHg. Zero length means the pressure was not measured Always empty	EMPTY	AUTO
(0022,000D)	2	CS	Pupil Dilated	Whether or not the patient's pupils were pharmacologically dilated for this acquisition. Enumerated Values: YES NO If this tag is empty, no information is available. Always empty	EMPTY	AUTO

**Table 8-24 Ophthalmic Photography IOD - Module "Ophthalmic Photographic Parameters"**

Tag	Type	VR	Name	Description	PoV	Source
(0022,0015)	1	SQ	Acquisition Device Type Code Sequence	Describes the type of acquisition device. A single item shall be included in this sequence.	ALWAYS	AUTO
>(0008,0100)	1	SH	Code Value	Always "OPTICAL_BIOMETRY"	ALWAYS	AUTO
>(0008,0102)	1	SH	Coding Scheme Designator	Always "99CZM"	ALWAYS	AUTO
>(0008,0103)	1C	SH	Coding Scheme Version	Always " 20160301"	ALWAYS	AUTO

>(0008,0104)	1	LO	Code Meaning	Always "Optical Biometry"	ALWAYS	AUTO
(0022,0016)	2	SQ	Illumination Type Code Sequence	Coded value for illumination. Zero or one item shall be included in this sequence. Always empty sequence	EMPTY	AUTO
(0022,0017)	2	SQ	Light Path Filter Type Stack Code Sequence	Filters used in the light source path. Zero or more items may be included in this sequence. Always empty sequence	EMPTY	AUTO
(0022,0018)	2	SQ	Image Path Filter Type Stack Code Sequence	Describes stack of filters used in image path. Zero or more items shall be included in this sequence. Always empty sequence	EMPTY	AUTO
(0022,0019)	2	SQ	Lenses Code Sequence	Lenses that were used during the image acquisition. Zero or more items shall be included in this sequence. Always empty sequence	EMPTY	AUTO
(0018,7004)	2	CS	Detector Type	Type of detector used for creating this image. Defined terms: CCD = Charge Coupled Devices CMOS = Complementary Metal Oxide Semiconductor Always "CMOS"	ALWAYS	AUTO

**Table 8-25 Ophthalmic Photography IOD - Module "SOP Common"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. See C.12.1.1.1 for further explanation. See also PS 3.4. Always "1.2.840.10008.5.1.4.1.1.77.1.5.1"	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS 3.4.	ALWAYS	AUTO



					IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.11.1.3." followed by a date/time stamp and machine specific identifier.		
(0008,0005)	1C	CS		Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See PS3.3 C.12.1.1.2 for Defined Terms.	ALWAYS	AUTO, CONFIG
(0008,0012)	3	DA		Instance Creation Date	See 6 Support of Character Sets. Date the SOP Instance was created.	ALWAYS	AUTO
(0008,0013)	3	TM		Instance Creation Time	Time the SOP Instance was created.	ALWAYS	AUTO
(0018,A001)	3	SQ		Contributing Equipment Sequence	Sequence of Items containing descriptive attributes of related equipment which has contributed to the acquisition, creation or modification of the composite instance. One or more Items may be included in this Sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation. Sequence contains one single item defining the equipment which originally acquired the measurement data.	ALWAYS	AUTO
>(0040,A170)	1	SQ		Purpose of Reference Code Sequence	Describes the purpose for which the related equipment is being reference. Only a single item shall be permitted in this sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation.	ALWAYS	AUTO
>>(0008,0100)	1	SH		Code Value	See NEMA PS3.3 Section 8.1. Always "109101"	ALWAYS	AUTO
>>(0008,0102)	1	SH		Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Always "DCM"	ALWAYS	AUTO
>>(0008,0104)	1	LO		Code Meaning	See NEMA PS3.3 Section 8.3. Always "Acquisition Equipment"	ALWAYS	AUTO
>(0008,0070)	1	LO		Manufacturer	Manufacturer of the equipment that contributed to the composite instance. Always "Carl Zeiss Meditec"	ALWAYS	AUTO
>(0008,0080)	3	LO		Institution Name	Institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Name is defined for contributing equipment.	ANAP	AUTO
>(0008,0081)	3	ST		Institution Address	Address of the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Address is defined for contributing equipment.	ANAP	AUTO

>(0008,1010)	3	SH	Station Name	User defined name identifying the machine that contributed to the composite instance. Attribute does not exist if no Station Name is defined for contributing equipment.	ANAP	AUTO
>(0008,1040)	3	LO	Institutional Department Name	Department in the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institutional Department Name is defined for contributing equipment.	ANAP	AUTO
>(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that contributed to the composite instance. Attribute does not exist if no Manufacturer's Model Name is defined for contributing equipment.	ANAP	AUTO
>(0018,1000)	3	LO	Device Serial Number	Manufacturer's serial number of the equipment that contributed to the composite instance. Attribute does not exist if no Device Serial Number is defined for contributing equipment.	ANAP	AUTO
>(0018,1020)	3	LO	Software Version(s)	Manufacturer's designation of the software version of the equipment that contributed to the composite instance. Attribute does not exist if no Software Version(s) is defined for contributing equipment.	ANAP	AUTO
>(0018,1200)	3	DA	Date of Last Calibration	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Date of Last Calibration is defined for contributing equipment.	ANAP	AUTO
>(0018,1201)	3	TM	Time of Last Calibration	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Time of Last Calibration is defined for contributing equipment.	ANAP	AUTO

### 8.1.1.10 Multi Frame Grayscale Byte Sc Image Modules

**Table 8-26 Multi Frame Grayscale Byte Sc Image IOD - Module "Sc Equipment"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0064)	1	CS	Conversion Type	Describes the kind of image conversion. Defined Terms : DV = Digitized Video DI = Digital Interface DF = Digitized Film WSD = Workstation SD = Scanned Document SI = Scanned Image DRW = Drawing SYN = Synthetic Image  Always "SYN"  Note: In case of Image Type (0008,0008) is "DERIVED\PRIMARY\OAM_QUALITY" the image is a synthesized multi-frame optical coherence tomography image. In case of Image Type (0008,0008) is "DERIVED\PRIMARY\KER_QUALITY" the image is a synthesized multi-frame difference image.	ALWAYS	AUTO
(0008,0060)	3	CS	Modality	Source equipment for the image. This type definition shall override the definition in the General Series Module. See NEMA PS3.3 C.7.3.1.1.1 for Defined Terms.  "OAM" for Ophthalmic Axial Measurements Quality Control Images "KER" for Keratometry Measurements Quality Control Images	ALWAYS	AUTO

**Table 8-27 Multi Frame Grayscale Byte Sc Image IOD - Module "General Image"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,0013)	2	IS	Instance Number	A number that identifies this image. Note: This Attribute was named Image Number in earlier versions of this Standard.	ALWAYS	AUTO
(0020,0020)	2C	CS	Patient Orientation	Patient direction of the rows and columns of the image. Required if image does not require Image Orientation (Patient) (0020,0037) and Image Position (Patient) (0020,0032). May be present otherwise. See C.7.6.1.1.1 for further explanation. Note: IOD's may have attributes	ALWAYS	AUTO

				other than Patient Orientation, Image Orientation, or Image Position (Patient) to describe orientation in which case this attribute will be zero length.		
(0008,0023)	2C	DA	Content Date	"PIR" for Ophthalmic Axial Measurements Quality Control Images "LF" for Keratometry Measurements Quality Control Images	ALWAYS	AUTO
(0008,0033)	2C	TM	Content Time	The date the image pixel data creation started. Required if image is part of a series in which the images are temporally related. May be present otherwise. Note: This Attribute was formerly known as Image Date.	ALWAYS	AUTO
(0008,0008)	3	CS	Image Type	The time the image pixel data creation started. Required if image is part of a series in which the images are temporally related. May be present otherwise.  Image identification characteristics. See NEMA PS3.3. C.7.6.1.1.2 for Defined Terms and further explanation.  "DERIVEDPRIMARY\IOAM_QUALITY" for Ophthalmic Axial Measurements Quality Control Images "DERIVEDPRIMARY\IKER_QUALITY" for Keratometry Measurements Quality Control Images	ALWAYS	AUTO
(0008,002A)	3	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
(0008,114A)	3	SQ	Referenced Instance Sequence	Non-image composite SOP Instances that are significantly related to this Image, including waveforms that may or may not be temporally synchronized with this image. One or more Items are permitted in this sequence.  For Quality Control Images the Referenced Instance Sequence is used to refer to the associated measurement SOP Instance.	ALWAYS	AUTO
>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class.  "1.2.840.10008.5.1.4.1.1.78.7" for Ophthalmic Axial Measurements SOP Class (used by Ophthalmic Axial Measurements Quality Control Images) "1.2.840.10008.5.1.4.1.1.78.3" for Keratometry Measurements SOP Class (used by Keratometry Measurements Quality Control Images)	ALWAYS	AUTO

>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO
>(0040,A170)	1	SQ	Purpose of Reference Code Sequence	Code describing the purpose of the reference to the Instance(s). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	Always "MEASUREMENTS"	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	Always "99CZM"	ALWAYS	AUTO
>>(0008,0103)	1C	SH	Coding Scheme Version	Always "20160301"	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	Always "Measurements SOP Instance associated with this image"	ALWAYS	AUTO
(0020,4000)	3	LT	Image Comments	User-defined comments about the image as well as localized equipment generated warnings regarding validation results for the performed measurement.	ANAP	USER AUTO
(0028,0300)	3	CS	Quality Control Image	Indicates whether or not this image is a quality control or phantom image. Enumerated Values: YES NO If this Attribute is absent, then the image may or may not be a quality control or phantom image. The phantom device in the image can be described using the Device Module. See NEMA PS3.3 C.7.6.12	ALWAYS	AUTO
(0028,2110)	3	CS	Lossy Image Compression	Always "YES"  Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression. See NEMA PS 3.3 C.7.6.1.1.5	ALWAYS	AUTO
(0028,2112)	3	DS	Lossy Image Compression Ratio	Always "01"  Describes the approximate lossy compression ratio(s) that have been applied to this image. See NEMA PS3.3 C.7.6.1.1.5 for further explanation. May be multivalued if successive lossy compression steps have been applied. Notes: 1. For example, a compression ratio of 30:1 would be described in this Attribute with a single value of 30. 2. For historical reasons, the lossy compression ratio may also be described in Derivation Description (0008,2111).	ALWAYS	AUTO
(0028,2114)	3	CS	Lossy Image Compression Method	A label for the lossy compression method(s) that have been applied to this image. See NEMA PS3.3 C.7.6.1.1.5 for further explanation. May be multivalued if successive lossy compression steps have been applied; the value order shall correspond to the values of	ALWAYS	AUTO

					Lossy Image Compression Ratio (0028,2112). Note: For historical reasons, the lossy compression method may also be described in Derivation Description (0008,2111).	
					Always "ISO_10918_1"	

**Table 8-28 Multi Frame Grayscale Byte Sc Image IOD - Module "Image Pixel"**

Tag	Type	VR	Name	Description	PoV	Source
(0028,0002)	1	US	Samples per Pixel	Number of samples (planes) in this image. See NEMA PS3.3 C.7.6.3.1.1 for further explanation. Always "1"	ALWAYS	AUTO
(0028,0004)	1	CS	Photometric Interpretation	Specifies the intended interpretation of the pixel data. See NEMA PS3.3 C.7.6.3.1.2 for further explanation. Always "MONOCHROME2"	ALWAYS	AUTO
(0028,0010)	1	US	Rows	Number of rows in the image.	ALWAYS	AUTO
(0028,0011)	1	US	Columns	Number of columns in the image	ALWAYS	AUTO
(0028,0100)	1	US	Bits Allocated	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. See PS 3.5 for further explanation. Always "8"	ALWAYS	AUTO
(0028,0101)	1	US	Bits Stored	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored. See PS 3.5 for further explanation. Always "8"	ALWAYS	AUTO
(0028,0102)	1	US	High Bit	Most significant bit for pixel sample data. Each sample shall have the same high bit. See PS 3.5 for further explanation. Always "7"	ALWAYS	AUTO

(0028,0103)	1	US	Pixel Representation	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated Values: 0 = unsigned integer. 1 = 2's complement Always "0"	ALWAYS	AUTO
(7FE0,0010)	1C	OWB	Pixel Data	A data stream of the pixel samples that comprise the Image. See C.7.6.3.1.4 for further explanation. Required if Pixel Data Provider URL (0028,7FE0) is not present.	ALWAYS	AUTO

**Table 8-29 Multi Frame Grayscale Byte Sc Image IOD - Module "Multi-frame"**

Tag	Type	VR	Name	Description	PoV	Source
(0028,0008)	1	IS	Number of Frames	Number of frames in a Multi-frame Image. See NEMA PS3.3 C.7.6.6.1.1 for further explanation.	ALWAYS	AUTO

**Table 8-30 Multi Frame Grayscale Byte Sc Image IOD - Module "Frame Pointers"**

Tag	Type	VR	Name	Description	PoV	Source
(0028,6010)	3	US	Representative Frame Number	The frame number selected for use as a pictorial representation (e.g. icon) of the Multi-frame Image The first frame in this image starts with number 1.	ALWAYS	AUTO

**Table 8-31 Multi Frame Grayscale Byte Sc Image IOD - Module "Sc Multi Frame Image"**

Tag	Type	VR	Name	Description	PoV	Source
(0028,0301)	1	CS	Burned In Annotation	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. Enumerated Values: YES NO Always "No"	ALWAYS	AUTO
(2050,0020)	1C	CS	Presentation LUT Shape	Specifies an identity transformation for the Presentation LUT, such that the output of all grayscale transformations defined in the IOD containing this Module are defined to be P-Values. Enumerated Values: IDENTITY - output is P-Values. Required if Photometric	ALWAYS	AUTO



				Interpretation (0028,0004) is MONOCHROME2, and BitsStored (0028,0101) is greater than 1. Note: If the VOI LUT Module is required by the IOD but no VOI LUT Sequence (0028,3010) or Window Center (0028,1050) is present, then the VOI LUT stage is an identity transformation.  Always "IDENTITY"	
(0028,1052)	1C	DS	Rescale Intercept	The value b in the relationship between stored values (SV) in Pixel Data (7FE0,0010) and the output units specified in Rescale Type (0028,1054). Output units = m*SV + b. Enumerated Value: 0 Required if Photometric Interpretation (0028,0004) is MONOCHROME2, and BitsStored (0028,0101) is greater than 1. Note: This specifies an identity Modality LUT transformation.  Always "0"	AUTO
(0028,1053)	1C	DS	Rescale Slope	m in the equation specified by Rescale Intercept (0028,1052). Enumerated Value: 1 Required if Photometric Interpretation (0028,0004) is MONOCHROME2, and BitsStored (0028,0101) is greater than 1. Note: This specifies an identity Modality LUT transformation.  Always "1"	AUTO
(0028,1054)	1C	LO	Rescale Type	Specifies the output units of Rescale Slope (0028,1053) and Rescale Intercept (0028,1052). Enumerated Value: US = Unspecified Required if Photometric Interpretation (0028,0004) is MONOCHROME2, and BitsStored (0028,0101) is greater than 1. Note: This specifies an identity Modality LUT transformation.  Always "US"	AUTO
(0028,0009)	1C	AT	Frame Increment Pointer	Contains the Data Element Tag of the attribute which is used as the frame increment in Multi-frame pixel data. See C.7.6.6.1.2 for further explanation. Shall be present if Number of Frames is greater than 1, overriding (specializing) the Type 1 requirement on this attribute in the Multi-frame Module.  Always "(0018,2002)" for Frame Label Vector	AUTO
(0028,0030)	1C	DS	Pixel Spacing	Physical distance in the patient between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. See 10.7.1.1 and 10.7.1.3. Required if the image has been calibrated. May be present otherwise.	AUTO



				Multi-value attribute containing 2 values: 1) adjacent row spacing in mm 2) adjacent column spacing in mm	
				Note 1: Images with the attribute Quality Control Image (0028,0300) set to "YES" shall not be used for diagnostic purposes like measuring but only for quality control. Note 2: For software versions "1.90.6.54" and later the attribute Pixel Spacing (0028,0030) does not exist in Axial Measurement Quality Control images (Image Type (0008,0008) set to "DERIVED\PRIMARY\IOAM_QUALITY").	

**Table 8-32 Multi Frame Grayscale Byte Sc Image IOD - Module "Sc Multi Frame Vector"**

Tag	Type	VR	Name	Description	PoV	Source
(0018,2002)	1C	SH	Frame Label Vector	An array which contains, for each of the image frames, a descriptive label. Required if Frame Increment Pointer (0028,0009) points to Frame Label Vector (0018,2002).  Contains <frame_number> values. The frame number starting with "1" is used as value for the label.	ALWAYS	AUTO

**Table 8-33 Multi Frame Grayscale Byte Sc Image IOD - Module "Sop Common"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. See NEMA PS3.3 C.12.1.1.1 for further explanation. See also PS 3.4.  Always "1.2.840.10008.5.1.4.1.1.7.2"	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. See NEMA PS3.3 C.12.1.1.1 for further explanation. See also PS 3.4.  IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.11.1.3." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO

(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See PS3.3 C.12.1.1.2 for Defined Terms. See 6 Support of Character Sets.	ALWAYS	AUTO, CONFIG
(0008,0012)	3	DA	Instance Creation Date	Date the SOP Instance was created.	ALWAYS	AUTO
(0008,0013)	3	TM	Instance Creation Time	Time the SOP Instance was created.	ALWAYS	AUTO
(0018,A001)	3	SQ	Contributing Equipment Sequence	Sequence of Items containing descriptive attributes of related equipment which has contributed to the acquisition, creation or modification of the composite instance. One or more Items may be included in this Sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation. Sequence contains one single item defining the equipment which originally acquired the measurement data.	ALWAYS	AUTO
>(0040,A170)	1	SQ	Purpose of Reference Code Sequence	Describes the purpose for which the related equipment is being reference. Only a single Item shall be permitted in this sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1. Always "109101"	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Always "DCM"	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3. Always "Acquisition Equipment"	ALWAYS	AUTO
>(0008,0070)	1	LO	Manufacturer	Manufacturer of the equipment that contributed to the composite instance. Always "Carl Zeiss Meditec"	ALWAYS	AUTO
>(0008,0080)	3	LO	Institution Name	Institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Name is defined for contributing equipment.	ANAP	AUTO
>(0008,0081)	3	ST	Institution Address	Address of the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Address is defined for contributing equipment.	ANAP	AUTO
>(0008,1010)	3	SH	Station Name	User defined name identifying the machine that contributed to the composite instance.	ANAP	AUTO

				Attribute does not exist if no Station Name is defined for contributing equipment.		
>(0008,1040)	3	LO	Institutional Department Name	Department in the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institutional Department Name is defined for contributing equipment.	ANAP	AUTO
>(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that contributed to the composite instance. Attribute does not exist if no Manufacturer's Model Name is defined for contributing equipment.	ANAP	AUTO
>(0018,1000)	3	LO	Device Serial Number	Manufacturer's serial number of the equipment that contributed to the composite instance. Attribute does not exist if no Device Serial Number is defined for contributing equipment.	ANAP	AUTO
>(0018,1020)	3	LO	Software Version(s)	Manufacturer's designation of the software version of the equipment that contributed to the composite instance. Attribute does not exist if no Software Version(s) is defined for contributing equipment.	ANAP	AUTO
>(0018,1200)	3	DA	Date of Last Calibration	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Date of Last Calibration is defined for contributing equipment.	ANAP	AUTO
>(0018,1201)	3	TM	Time of Last Calibration	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Time of Last Calibration is defined for contributing equipment.	ANAP	AUTO

**Table 8-34 Multi Frame Grayscale Byte Sc Image IOD - Module "Czm Multi Frame Grayscale Byte Sc Image Extension"**

Tag	Type	VR	Name	Description	PoV	Source
(0020,0062)	3	CS	Image Laterality	Enumerated Values: R = right L = left U = unpaired B = both left and right	ALWAYS	AUTO

### 8.1.1.11 Ophthalmic Axial Measurements Modules

**Table 8-35 Ophthalmic Axial Measurements IOD - Module "Ophthalmic Axial Measurements Series"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0060)	1	CS	Modality	Type of equipment that originally acquired the data used to create the measurements in this Series. Enumerated Values: OAM See section NEMA PS3.3 Section C.7.3.1.1.1 for further explanation.  Always "OAM"	ALWAYS	AUTO

**Table 8-36 Ophthalmic Axial Measurements IOD - Module "Ophthalmic Axial Measurements"**

Tag	Type	VR	Name	Description	PoV	Source
(0022,1009)	1	CS	Ophthalmic Axial Measurements Device Type	Describes the type of ophthalmic axial measurement acquisition device. Defined Terms: ULTRASOUND OPTICAL  Always "OPTICAL"	ALWAYS	AUTO
(0022,1125)	3	SQ	Anterior Chamber Depth Definition Code Sequence	The definition of anterior chamber depth for this instrument. Only a single Item is permitted in this sequence.	ALWAYS	AUTO
>(0008,0100)	1	SH	Code Value	Always "111776"	ALWAYS	AUTO
>(0008,0102)	1	SH	Coding Scheme Designator	Always "DCM"	ALWAYS	AUTO
>(0008,0104)	1	LO	Code Meaning	Always "Front Of Cornea To Front Of Lens"	ALWAYS	AUTO
(0022,1007)	1C	SQ	Ophthalmic Axial Measurements Right Eye Sequence	Axial measurements of a patient's right eye. Only a single Item shall be included in this sequence. Required if the right eye is measured.	ANAP	AUTO
>(0022,1024)	1	SQ	Lens Status Code Sequence	Lens status of the eye. See NEMA PS3.3 section C.8.25.14.1.1.1 for further explanation. Only a single Item shall be included in this sequence.	ALWAYS	AUTO

>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-75 Coded Values - Lens Status	ALWAYS	USER
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-75 Coded Values - Lens Status	ALWAYS	USER
>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-75 Coded Values - Lens Status	ANAP	USER
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-75 Coded Values - Lens Status	ALWAYS	USER
>(0022,1025)	1	SQ	Vitreous Status Code Sequence	Status of the vitreous cavity. See NEMA PS3.3 section C.8.25.14.1.1.2 for further explanation. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-76 Coded Values - Vitreous Status	ALWAYS	USER
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-76 Coded Values - Vitreous Status	ALWAYS	USER
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-76 Coded Values - Vitreous Status	ALWAYS	USER
>(0022,000D)	2	CS	Pupil Dilated	Whether or not the patient's pupils were pharmacologically dilated for this acquisition Enumerated Values: YES NO If this tag is empty, no information is available.  Always empty.	EMPTY	AUTO
>(0022,1050)	1	SQ	Ophthalmic Axial Length Measurements Sequence	Measurements of the axial length of a patient's eye. One or more items shall be included in this sequence.  Application software performs up to 6 separate measurement passes when acquiring the axial length of a patient's eye. Depending on successful processing each pass can result into 1 total axial length and up to 4 segmental lengths (cornea thickness, anterior chamber depth, lens thickness, aqueous depth).  This sequence will contain one TOTAL LENGTH item for all acquired total lengths and one SEGMENTAL LENGTH item for all acquired segmental lengths.	ALWAYS	AUTO
>>(0022,1010)	1	CS	Ophthalmic Axial Length Measurements Type	Identifies whether measuring the total axial length of the patient's eye or a segment of the eye for which a discrete measurement was obtained.  Enumerated Values:	ALWAYS	AUTO

				TOTAL LENGTH = the total axial length was taken with one measurement LENGTH SUMMATION = the total axial length is a summation of segmental lengths SEGMENTAL LENGTH = the length of a segment of the axis		
				"TOTAL LENGTH" or "SEGMENTAL LENGTH"		
>>(0022,1210)	1C	SQ	Ophthalmic Axial Length Measurements Total Length Sequence	The axial length of a patient's eye, in mm. One or more items shall be included in this sequence. Required if Ophthalmic Axial Length Measurements Type (0022,1010) is TOTAL LENGTH. See NEMA PS3.3 section C.8.25.14.1.1.4 for further explanation. Sequence exists for TOTAL LENGTH measurements.	ALWAYS	AUTO
>>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length measurement acquired, in mm. The type of measurement is specified in the Ophthalmic Axial Length Measurements Type (0022,1010). See NEMA PS3.3 sections C.8.25.14.1.1.3 and C.8.25.14.1.1.4 for further explanation.	ALWAYS	AUTO
>>>(0022,1140)	1	CS	Ophthalmic Axial Length Measurement Modified	Whether or not the clinician intervened to modify the output of the device. For example by forcing it to select a different peak in the display. Enumerated Values: YES NO Always "NO"	ALWAYS	AUTO
>>>(0022,1330)	1	SQ	Referenced Ophthalmic Axial Length Measurement QC Image Sequence	Reference to the quality control image associated with this measurement. Only a single item shall be included in this sequence. See section NEMA PS3.3 C.8.25.14.1.1.6 for further explanation.	ALWAYS	AUTO
>>>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Enumerated Values: "1.2.840.10008.5.1.4.1.1.7.2" = Multi-frame Grayscale Byte Secondary Capture Image Storage "1.2.840.10008.5.1.4.1.1.7.4" = Multi-frame True Color Secondary Capture Image Storage Always "1.2.840.10008.5.1.4.1.1.7.2"	ALWAYS	AUTO
>>>>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO
>>>>(0008,1160)	1	IS	Referenced Frame Number	Identifies the frame number within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Only a single value shall exist. Note: This Attribute is a multi-value field but for this Macro it can only contain one value.	ALWAYS	AUTO

>>>(0022,1225)	1C	SQ	Optical Ophthalmic Axial Length Measurements Sequence	Related information about an axial length measurement being performed on an optical device. Only a single item shall be included in this sequence. Required if Ophthalmic Axial Measurements Device Type (0022,1009) is OPTICAL.	ALWAYS	AUTO
>>>>(0022,1150)	1	SQ	Ophthalmic Axial Length Data Source Code Sequence	The source of the value in Ophthalmic Axial Length (0022,1019). Only a single item shall be included in this sequence. The application software uses (0022,1150) Ophthalmic Axial Length Data Source Code Sequence to specify detailed information on the scan angle at which the measurement has been performed.	ALWAYS	AUTO
>>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>(0022,1159)	3	LO	Ophthalmic Axial Length Data Source Description	A free text description of the axial length measurement data source.	ALWAYS	AUTO
>>(0022,1211)	1C	SQ	Ophthalmic Axial Length Measurements Segmental Length Sequence	Segmental axial length measurement of a patient's eye. Only a single item shall be included in this sequence. Required if Ophthalmic Axial Length Measurements Type (0022,1010) is SEGMENTAL LENGTH. See NEMA PS3.3 section C.8.25.14.1.1.4 for further explanation. Sequence exists for SEGMENTAL LENGTH measurements.	ALWAYS	AUTO
>>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length measurement acquired, in mm. The type of measurement is specified in the Ophthalmic Axial Length Measurements Type (0022,1010). See NEMA PS3.3 sections C.8.25.14.1.1.3 and C.8.25.14.1.1.4 for further explanation.	ALWAYS	AUTO
>>>(0022,1140)	1	CS	Ophthalmic Axial Length Measurement Modified	Whether or not the clinician intervened to modify the output of the device. For example by forcing it to select a different peak in the display. Enumerated Values: YES NO Always "NO"	ALWAYS	AUTO



>>>(0022,1101)	1	SQ	Ophthalmic Axial Length Measurements Segment Name Code Sequence	The name of the segment measured. See NEMA PS3.3 section C.8.25.14.1.1.4 for further explanation. Only a single item shall be included in this sequence. The application software uses (0022,1101) Ophthalmic Axial Length Measurements Segment Name Code Sequence to specify detailed information on the axial length segment of a patient's eye which has been measured.	ALWAYS	AUTO
>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>(0022,1225)	1C	SQ	Optical Ophthalmic Axial Length Measurements Sequence	Related information about an axial length measurement being performed on an optical device. Only a single item shall be included in this sequence. Required if Ophthalmic Axial Measurements Device Type (0022,1009) is OPTICAL.	ALWAYS	AUTO
>>>>(0022,1150)	1	SQ	Ophthalmic Axial Length Data Source Code Sequence	The source of the value in Ophthalmic Axial Length (0022,1019). Only a single item shall be included in this sequence. The application software uses (0022,1150) Ophthalmic Axial Length Data Source Code Sequence to specify detailed information on the scan angle at which the measurement has been performed.	ALWAYS	AUTO
>>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>(0022,1159)	3	LO	Ophthalmic Axial Length Data Source Description	A free text description of the axial length measurement data source.	ALWAYS	AUTO



>(0022,1255)	1C	SQ	Optical Selected Ophthalmic Axial Length Sequence	Information related to the selected axial length measurement(s) of the patient's eye when acquired on an optical device. One or more items shall be included in this sequence. Required if Ophthalmic Axial Measurements Device Type (0022,1009) is OPTICAL.  Application software processes all single measurements performed for a patient's eye to calculate a representative composite result. These composite values are stored to (0022,1255) Optical Selected Ophthalmic Axial Length Sequence. Depending on successful processing and calculation this sequence will contain one TOTAL LENGTH item for the selected total length and one SEGMENTAL LENGTH item for the selected segmental lengths.	ALWAYS	AUTO
>>(0022,1010)	3	CS	Ophthalmic Axial Length Measurements Type	Identifies whether measuring the total axial length of the patient's eye or a segment of the eye for which a discrete measurement was obtained.  Enumerated Values: TOTAL LENGTH the total axial length was taken with one measurement LENGTH SUMMATION the total axial length is a summation of segmental lengths SEGMENTAL LENGTH the length of a segment of the axis	ALWAYS	AUTO
>>(0022,1260)	1C	SQ	Selected Total Ophthalmic Axial Length Sequence	Total axial length measurement selected for the patient's eye.  Only a single item shall be included in this sequence.  Required if Ophthalmic Axial Length Measurements Type (0022,1010) is present and is either TOTAL LENGTH or LENGTH SUMMATION. Maybe present otherwise.  Note In case of Ophthalmic Axial Length Measurements Type (0022,1010) has the value LENGTH SUMMATION both the Selected Total Ophthalmic Axial Length Sequence (0022,1260) and Selected Segmental Ophthalmic Axial Length Sequence (0022,1257) are used.	ALWAYS	AUTO
>>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length measurement, in mm. The type of measurement is specified in the Ophthalmic Axial Length Measurements Type (0022,1010). See NEMA PS3.3 sections C.8.25.14.1.1.3 and C.8.25.14.1.1.4 for further explanation.	ALWAYS	AUTO
>>>(0022,1330)	1	SQ	Referenced Ophthalmic Axial Length Measurement QC Image Sequence	Reference to the quality control image associated with this measurement. Only a single item shall be included in this sequence. See NEMA PS3.3 section C.8.25.14.1.1.6 for further explanation.	ALWAYS	AUTO
>>>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Enumerated Values: "1.2.840.10008.5.1.4.1.1.7.2" = Multi-frame Grayscale Byte Secondary Capture Image	ALWAYS	AUTO

				Storage "1.2.840.10008.5.1.4.1.1.7.4" = Multi-frame True Color Secondary Capture Image Storage		
>>>>(0008,1155)	1	UI	Referenced SOP Instance UID	Always "1.2.840.10008.5.1.4.1.1.7.2"	ALWAYS	AUTO
>>>>(0008,1160)	1	IS	Referenced Frame Number	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO
>>>(0022,1262)	1	SQ	Ophthalmic Axial Length Quality Metric Sequence	Identifies the frame number within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Only a single value shall exist. Note: This Attribute is a multi-value field but for this Macro it can only contain one value.	ALWAYS	AUTO
>>>>(0040,A043)	1	SQ	Concept Name Code Sequence	Information about the quality metric applied to Ophthalmic Axial Length (0022,1019). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>>>(0008,0100)	1	SH	Code Value	Type of metric used to evaluate the quality of the ophthalmic axial length. Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>(0040,A30A)	1	DS	Numeric Value	Value for quality metric applied to axial length values.	ALWAYS	AUTO
>>>>(0040,08EA)	1	SQ	Measurement Units Code Sequence	Units of Numeric Value (0040,A30A). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>>>(0008,0100)	1	SH	Code Value	Always "1"	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	Always "UCUM"	ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	Always "no units"	ALWAYS	AUTO

>>(0022,1257)	1C	SQ	Selected Segmental Ophthalmic Axial Length Sequence	<p>Segmental axial length measurement(s) selected for the patient's eye. One or more items shall be included in this sequence.</p> <p>Required if the value of Ophthalmic Axial Length Measurements Type (0022,1010) is present and is either SEGMENTAL LENGTH or LLENGTH SUMMATION. May be present otherwise.</p> <p>Note</p> <p>In case of Ophthalmic Axial Length Measurements Type (0022,1010) has the value LENGTH SUMMATION both the Selected Total Ophthalmic Axial Length Sequence (0022,1260) and Selected Segmental Ophthalmic Axial Length Sequence (0022,1257) are used.</p>	ALWAYS	AUTO
>>>(0022,1101)	1	SQ	Ophthalmic Axial Length Measurements Segment Name Code Sequence	<p>The name of the segment measured. See NEMA PS3.3 section C.8.25.14.1.1.4 for further explanation. Only a single Item shall be included in this sequence.</p> <p>The application software uses (0022,1101) Ophthalmic Axial Length Measurements Segment Name Code Sequence to specify detailed information on the axial length segment of a patient's eye which has been measured.</p>	ALWAYS	AUTO
>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length measurement, in mm. The type of measurement is specified in the Ophthalmic Axial Length Measurements Type (0022,1010). See sections C.8.25.14.1.1.3 and C.8.25.14.1.1.4 for further explanation.	ALWAYS	AUTO
>>>(0022,1330)	1	SQ	Referenced Ophthalmic Axial Length Measurement QC Image Sequence	Reference to the quality control image associated with this measurement. Only a single Item shall be included in this sequence. See NEMA PS3.3 section C.8.25.14.1.1.6 for further explanation.	ALWAYS	AUTO
>>>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Enumerated Values: "1.2.840.10008.5.1.4.1.1.7.2" = Multi-frame Grayscale Byte Secondary Capture Image	ALWAYS	AUTO

				Storage "1.2.840.10008.5.1.4.1.1.7.4" = Multi-frame True Color Secondary Capture Image Storage		
>>>>(0008,1155)	1	UI	Referenced SOP Instance UID	Always "1.2.840.10008.5.1.4.1.1.7.2"	ALWAYS	AUTO
>>>>(0008,1160)	1	IS	Referenced Frame Number	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO
>>>(0022,1262)	1	SQ	Ophthalmic Axial Length Quality Metric Sequence	Identifies the frame number within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Only a single value shall exist. Note: This Attribute is a multi-value field but for this Macro it can only contain one value.	ALWAYS	AUTO
>>>>(0040,A043)	1	SQ	Concept Name Code Sequence	Information about the quality metric applied to Ophthalmic Axial Length (0022,1019). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>>>(0008,0100)	1	SH	Code Value	Type of metric used to evaluate the quality of the ophthalmic axial length. Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>(0040,A30A)	1	DS	Numeric Value	Value for quality metric applied to axial length values.	ALWAYS	AUTO
>>>>(0040,08EA)	1	SQ	Measurement Units Code Sequence	Units of Numeric Value (0040,A30A). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>>>(0008,0100)	1	SH	Code Value	Always "1"	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	Always "UCUM"	ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	Always "no units"	ALWAYS	AUTO

(0022,1008)	1C	SQ	Ophthalmic Axial Measurements Left Eye Sequence	Axial measurements of a patient's left eye. Only a single Item shall be included in this sequence. Required if the left eye is measured.	ANAP	AUTO
>(0022,1024)	1	SQ	Lens Status Code Sequence	Lens status of the eye. See NEMA PS3.3 section C.8.25.14.1.1.1 for further explanation. Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-75 Coded Values - Lens Status	ALWAYS	USER
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-75 Coded Values - Lens Status	ALWAYS	USER
>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-75 Coded Values - Lens Status	ANAP	USER
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-75 Coded Values - Lens Status	ALWAYS	USER
>(0022,1025)	1	SQ	Vitreous Status Code Sequence	Status of the vitreous cavity. See NEMA PS3.3 section C.8.25.14.1.1.2 for further explanation. Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-76 Coded Values - Vitreous Status	ALWAYS	USER
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-76 Coded Values - Vitreous Status	ALWAYS	USER
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-76 Coded Values - Vitreous Status	ALWAYS	USER
>(0022,000D)	2	CS	Pupil Dilated	Whether or not the patient's pupils were pharmacologically dilated for this acquisition Enumerated Values: YES NO If this tag is empty, no information is available.  Always empty.	EMPTY	AUTO
>(0022,1050)	1	SQ	Ophthalmic Axial Length Measurements Sequence	Measurements of the axial length of a patient's eye. One or more items shall be included in this sequence. Application software performs up to 6 separate measurement passes when acquiring the axial length of a patient's eye. Depending on successful processing each pass can result	ALWAYS	AUTO

				into 1 total axial length and up to 4 segmental lengths (cornea thickness, anterior chamber depth, lens thickness, aqueous depth). This sequence will contain one TOTAL LENGTH item for all acquired total lengths and one SEGMENTAL LENGTH item for all acquired segmental lengths.		
>>(0022,1010)	1	CS	Ophthalmic Axial Length Measurements Type	Identifies whether measuring the total axial length of the patient's eye or a segment of the eye for which a discrete measurement was obtained. Enumerated Values: TOTAL LENGTH = the total axial length was taken with one measurement LENGTH SUMMATION = the total axial length is a summation of segmental lengths SEGMENTAL LENGTH = the length of a segment of the axis  "TOTAL LENGTH" or "SEGMENTAL LENGTH"	ALWAYS	AUTO
>>(0022,1210)	1C	SQ	Ophthalmic Axial Length Measurements Total Length Sequence	The axial length of a patient's eye, in mm. One or more items shall be included in this sequence. Required if Ophthalmic Axial Length Measurements Type (0022,1010) is TOTAL LENGTH. See NEMA PS3.3 section C.8.25.14.1.1.4 for further explanation. Sequence exists for TOTAL LENGTH measurements.	ALWAYS	AUTO
>>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length measurement acquired, in mm. The type of measurement is specified in the Ophthalmic Axial Length Measurements Type (0022,1010). See NEMA PS3.3 sections C.8.25.14.1.1.3 and C.8.25.14.1.1.4 for further explanation.	ALWAYS	AUTO
>>>(0022,1140)	1	CS	Ophthalmic Axial Length Measurement Modified	Whether or not the clinician intervened to modify the output of the device. For example by forcing it to select a different peak in the display. Enumerated Values: YES NO  Always "NO"	ALWAYS	AUTO
>>>(0022,1330)	1	SQ	Referenced Ophthalmic Axial Length Measurement QC Image Sequence	Reference to the quality control image associated with this measurement. Only a single item shall be included in this sequence. See section NEMA PS3.3 C.8.25.14.1.1.6 for further explanation.	ALWAYS	AUTO
>>>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Enumerated Values: "1.2.840.10008.5.1.4.1.1.7.2" = Multi-frame Grayscale Byte Secondary Capture Image Storage "1.2.840.10008.5.1.4.1.1.7.4" = Multi-frame True Color Secondary Capture Image Storage	ALWAYS	AUTO

				Always "1.2.840.10008.5.1.4.1.1.7.2"			
>>>>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO	
>>>>(0008,1160)	1	IS	Referenced Frame Number	Identifies the frame number within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Only a single value shall exist. Note: This Attribute is a multi-value field but for this Macro it can only contain one value.	ALWAYS	AUTO	
>>>(0022,1225)	1C	SQ	Optical Ophthalmic Axial Length Measurements Sequence	Related information about an axial length measurement being performed on an optical device. Only a single item shall be included in this sequence. Required if Ophthalmic Axial Measurements Device Type (0022,1009) is OPTICAL.	ALWAYS	AUTO	
>>>>(0022,1150)	1	SQ	Ophthalmic Axial Length Data Source Code Sequence	The source of the value in Ophthalmic Axial Length (0022,1019). Only a single item shall be included in this sequence. The application software uses (0022,1150) Ophthalmic Axial Length Data Source Code Sequence to specify detailed information on the scan angle at which the measurement has been performed.	ALWAYS	AUTO	
>>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO	
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO	
>>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO	
>>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO	
>>>>(0022,1159)	3	LO	Ophthalmic Axial Length Data Source Description	A free text description of the axial length measurement data source.	ALWAYS	AUTO	
>>(0022,1211)	1C	SQ	Ophthalmic Axial Length Measurements Segmental Length Sequence	Segmental axial length measurement of a patient's eye. Only a single item shall be included in this sequence. Required if Ophthalmic Axial Length Measurements Type (0022,1010) is SEGMENTAL LENGTH. See NEMA PS3.3 section C.8.25.14.1.1.4 for further explanation. Sequence exists for SEGMENTAL LENGTH measurements.	ALWAYS	AUTO	
>>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length measurement acquired, in mm. The type of measurement is specified in the Ophthalmic Axial Length Measurements Type (0022,1010). See NEMA PS3.3 sections C.8.25.14.1.1.3 and C.8.25.14.1.1.4 for further explanation.	ALWAYS	AUTO	



>>>(0022,1140)	1	CS	Ophthalmic Axial Length Measurement Modified	Whether or not the clinician intervened to modify the output of the device. For example by forcing it to select a different peak in the display. Enumerated Values: YES NO Always "NO"	ALWAYS	AUTO
>>>(0022,1101)	1	SQ	Ophthalmic Axial Length Measurements Segment Name Code Sequence	The name of the segment measured. See NEMA PS3.3 section C.8.25.14.1.1.4 for further explanation. Only a single Item shall be included in this sequence. The application software uses (0022,1101) Ophthalmic Axial Length Measurements Segment Name Code Sequence to specify detailed information on the axial length segment of a patient's eye which has been measured.	ALWAYS	AUTO
>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names	ALWAYS	AUTO
>>>(0022,1225)	1C	SQ	Optical Ophthalmic Axial Length Measurements Sequence	Related information about an axial length measurement being performed on an optical device. Only a single Item shall be included in this sequence. Required if Ophthalmic Axial Measurements Device Type (0022,1009) is OPTICAL.	ALWAYS	AUTO
>>>>(0022,1150)	1	SQ	Ophthalmic Axial Length Data Source Code Sequence	The source of the value in Ophthalmic Axial Length (0022,1019). Only a single Item shall be included in this sequence. The application software uses (0022,1150) Ophthalmic Axial Length Data Source Code Sequence to specify detailed information on the scan angle at which the measurement has been performed.	ALWAYS	AUTO
>>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO



>>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>(0022,1159)	3	LO	Ophthalmic Axial Length Data Source Description	A free text description of the axial length measurement data source.	ALWAYS	AUTO
>(0022,1255)	1C	SQ	Optical Selected Ophthalmic Axial Length Sequence	Information related to the selected axial length measurement(s) of the patient's eye when acquired on an optical device. One or more items shall be included in this sequence. Required if Ophthalmic Axial Measurements Device Type (0022,1009) is OPTICAL. Application software processes all single measurements performed for a patient's eye to calculate a representative composite result. These composite values are stored to (0022,1255) Optical Selected Ophthalmic Axial Length Sequence. Depending on successful processing and calculation this sequence will contain one TOTAL LENGTH item for the selected total length and one SEGMENTAL LENGTH item for the selected segmental lengths.	ALWAYS	AUTO
>>(0022,1010)	3	CS	Ophthalmic Axial Length Measurements Type	Identifies whether measuring the total axial length of the patient's eye or a segment of the eye for which a discrete measurement was obtained. Enumerated Values: TOTAL LENGTH the total axial length was taken with one measurement LENGTH SUMMATION the total axial length is a summation of segmental lengths SEGMENTAL LENGTH the length of a segment of the axis	ALWAYS	AUTO
>>(0022,1260)	1C	SQ	Selected Total Ophthalmic Axial Length Sequence	Total axial length measurement selected for the patient's eye. Only a single item shall be included in this sequence. Required if Ophthalmic Axial Length Measurements Type (0022,1010) is present and is either TOTAL LENGTH or LENGTH SUMMATION. Maybe present otherwise. Note In case of Ophthalmic Axial Length Measurements Type (0022,1010) has the value LENGTH SUMMATION both the Selected Total Ophthalmic Axial Length Sequence (0022,1260) and Selected Segmental Ophthalmic Axial Length Sequence (0022,1257) are used.	ALWAYS	AUTO
>>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length measurement, in mm. The type of measurement is specified in the Ophthalmic Axial Length Measurements Type (0022,1010). See NEMA PS3.3 sections C.8.25.14.1.1.3 and C.8.25.14.1.1.4 for further explanation.	ALWAYS	AUTO

>>>(0022,1330)	1	SQ	Referenced Ophthalmic Axial Length Measurement QC Image Sequence	Reference to the quality control image associated with this measurement. Only a single item shall be included in this sequence. See NEMA PS3.3 section C.8.25.14.1.1.6 for further explanation.	ALWAYS	AUTO
>>>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Enumerated Values: "1.2.840.10008.5.1.4.1.1.7.2" = Multi-frame Grayscale Byte Secondary Capture Image Storage "1.2.840.10008.5.1.4.1.1.7.4" = Multi-frame True Color Secondary Capture Image Storage  Always "1.2.840.10008.5.1.4.1.1.7.2"	ALWAYS	AUTO
>>>>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO
>>>>(0008,1160)	1	IS	Referenced Frame Number	Identifies the frame number within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Only a single value shall exist. Note: This Attribute is a multi-value field but for this Macro it can only contain one value.	ALWAYS	AUTO
>>>(0022,1262)	1	SQ	Ophthalmic Axial Length Quality Metric Sequence	Information about the quality metric applied to Ophthalmic Axial Length (0022,1019). Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>>>(0040,A043)	1	SQ	Concept Name Code Sequence	Type of metric used to evaluate the quality of the ophthalmic axial length. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>(0040,A30A)	1	DS	Numeric Value	Value for quality metric applied to axial length values.	ALWAYS	AUTO
>>>>(0040,08EA)	1	SQ	Measurement Units Code Sequence	Units of Numeric Value (0040,A30A). Only a single item shall be included in this sequence.	ALWAYS	AUTO

>>>>>(0008,0100)	1	SH	Code Value	Always "1"		ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	Always "UCUM"		ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	Always "no units"		ALWAYS	AUTO
>>(0022,1257)	1C	SQ	Selected Segmental Ophthalmic Axial Length Sequence	Segmental axial length measurement(s) selected for the patient's eye. One or more items shall be included in this sequence. Required if the value of Ophthalmic Axial Length Measurements Type (0022,1010) is present and is either SEGMENTAL LENGTH or LENGTH SUMMATION. May be present otherwise. Note In case of Ophthalmic Axial Length Measurements Type (0022,1010) has the value LENGTH SUMMATION both the Selected Total Ophthalmic Axial Length Sequence (0022,1260) and Selected Segmental Ophthalmic Axial Length Sequence (0022,1257) are used.		ALWAYS	AUTO
>>>(0022,1101)	1	SQ	Ophthalmic Axial Length Measurements Segment Name Code Sequence	The name of the segment measured. See NEMA PS3.3 section C.8.25.14.1.1.4 for further explanation. Only a single item shall be included in this sequence. The application software uses (0022,1101) Ophthalmic Axial Length Measurements Segment Name Code Sequence to specify detailed information on the axial length segment of a patient's eye which has been measured.		ALWAYS	AUTO
>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names		ALWAYS	AUTO
>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names		ALWAYS	AUTO
>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names		ALWAYS	AUTO
>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-77 Coded Values - Ophthalmic Axial Length Measurements Segment Names		ALWAYS	AUTO
>>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length measurement, in mm. The type of measurement is specified in the Ophthalmic Axial Length Measurements Type (0022,1010). See sections C.8.25.14.1.1.3 and C.8.25.14.1.1.4 for further explanation.		ALWAYS	AUTO

>>>(0022,1330)	1	SQ	Referenced Ophthalmic Axial Length Measurement QC Image Sequence	Reference to the quality control image associated with this measurement. Only a single item shall be included in this sequence. See NEMA PS3.3 section C.8.25.14.1.1.6 for further explanation.	ALWAYS	AUTO
>>>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Enumerated Values: "1.2.840.10008.5.1.4.1.1.7.2" = Multi-frame Grayscale Byte Secondary Capture Image Storage "1.2.840.10008.5.1.4.1.1.7.4" = Multi-frame True Color Secondary Capture Image Storage  Always "1.2.840.10008.5.1.4.1.1.7.2"	ALWAYS	AUTO
>>>>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO
>>>>(0008,1160)	1	IS	Referenced Frame Number	Identifies the frame number within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Only a single value shall exist. Note: This Attribute is a multi-value field but for this Macro it can only contain one value.	ALWAYS	AUTO
>>>(0022,1262)	1	SQ	Ophthalmic Axial Length Quality Metric Sequence	Information about the quality metric applied to Ophthalmic Axial Length (0022,1019). Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>>>(0040,A043)	1	SQ	Concept Name Code Sequence	Type of metric used to evaluate the quality of the ophthalmic axial length. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0103)	1C	SH	Coding Scheme Version	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-87 Coded Values - Ophthalmic Quality Metric Type	ALWAYS	AUTO
>>>>(0040,A30A)	1	DS	Numeric Value	Value for quality metric applied to axial length values.	ALWAYS	AUTO
>>>>(0040,08EA)	1	SQ	Measurement Units Code Sequence	Units of Numeric Value (0040,A30A). Only a single item shall be included in this sequence.	ALWAYS	AUTO

>>>>>(0008,0100)	1	SH	Code Value	Always "1"	ALWAYS	AUTO
>>>>>(0008,0102)	1	SH	Coding Scheme Designator	Always "UCUM"	ALWAYS	AUTO
>>>>>(0008,0104)	1	LO	Code Meaning	Always "no units"	ALWAYS	AUTO

**Table 8-37 Ophthalmic Axial Measurements IOD - Module "Sop Common"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. See NEMA PS3.3 C.12.1.1.1 for further explanation. See also PS 3.4.  Always "1.2.840.10008.5.1.4.1.1.78.7"	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. See NEMA PS3.3 C.12.1.1.1 for further explanation. See also PS 3.4.  IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.11.1.3." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See PS3.3 C.12.1.1.2 for Defined Terms.  See 6 Support of Character Sets.	ALWAYS	AUTO, CONFIG
(0008,0012)	3	DA	Instance Creation Date	Date the SOP Instance was created.	ALWAYS	AUTO
(0008,0013)	3	TM	Instance Creation Time	Time the SOP Instance was created.	ALWAYS	AUTO
(0018,A001)	3	SQ	Contributing Equipment Sequence	Sequence of items containing descriptive attributes of related equipment which has contributed to the acquisition, creation or modification of the composite instance. One or more items may be included in this Sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation.  Sequence contains one single item defining the equipment which originally acquired the measurement data.	ALWAYS	AUTO

>(0040,A170)	1	SQ	Purpose of Reference Code Sequence	Describes the purpose for which the related equipment is being reference. Only a single item shall be permitted in this sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1. Always "109101"	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Always "DCM"	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3. Always "Acquisition Equipment"	ALWAYS	AUTO
>(0008,0070)	1	LO	Manufacturer	Manufacturer of the equipment that contributed to the composite instance. Always "Carl Zeiss Meditec"	ALWAYS	AUTO
>(0008,0080)	3	LO	Institution Name	Institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Name is defined for contributing equipment.	ANAP	AUTO
>(0008,0081)	3	ST	Institution Address	Address of the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Address is defined for contributing equipment.	ANAP	AUTO
>(0008,1010)	3	SH	Station Name	User defined name identifying the machine that contributed to the composite instance. Attribute does not exist if no Station Name is defined for contributing equipment.	ANAP	AUTO
>(0008,1040)	3	LO	Institutional Department Name	Department in the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institutional Department Name is defined for contributing equipment.	ANAP	AUTO
>(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that contributed to the composite instance. Attribute does not exist if no Manufacturer's Model Name is defined for contributing equipment.	ANAP	AUTO
>(0018,1000)	3	LO	Device Serial Number	Manufacturer's serial number of the equipment that contributed to the composite instance. Attribute does not exist if no Device Serial Number is defined for contributing equipment.	ANAP	AUTO

>(0018,1020)	3	LO	Software Version(s)	Manufacturer's designation of the software version of the equipment that contributed to the composite instance. Attribute does not exist if no Software Version(s) is defined for contributing equipment.	ANAP	AUTO
>(0018,1200)	3	DA	Date of Last Calibration	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Date of Last Calibration is defined for contributing equipment.	ANAP	AUTO
>(0018,1201)	3	TM	Time of Last Calibration	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Time of Last Calibration is defined for contributing equipment.	ANAP	AUTO

**Table 8-38 Ophthalmic Axial Measurements IOD - Module "CZM IOLM Clinical Patient Information"**

Tag	Type	VR	Name	Description	PoV	Source
(1203,xx01)	3	SQ	IOLMaster Clinical Patient Information Right Eye Sequence	Information used to represent ophthalmic clinical information during an ophthalmic measurement of a patient's right eye. Only a single item shall be included in this sequence. Required if Measurement Laterality (0024,0113) is R or B.	ANAP	AUTO
>(1203,xx03)	3	SQ	Refractive State Sequence	Refractive state of the measured eye at the time of acquisition. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx04)	1	FD	Sphere Power	Sphere value in diopters.	ALWAYS	USER
>>(1203,xx05)	1	FD	Cylinder Power	Cylinder value in diopters.	ALWAYS	USER
>>(1203,xx06)	1	FD	Cylinder Axis	Axis value in degrees.	ALWAYS	USER
>>(1203,xx07)	1	FD	Vertex Distance	Vertex distance in millimeters	ALWAYS	CONFIG
>(1203,xx08)	3	SQ	Visual Acuity Sequence	Visual acuity of a patient's eye at the time of measurement. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx09)	1	FD	Decimal Visual Acuity	A patient's visual acuity specified in decimal. See PS 3.17 Ophthalmic Refractive Reports Use Cases for guidance in converting Decimal Visual Acuity to other customarily used display notation such as 20/20 in the US and 6/6 in Britain.	ALWAYS	USER



>(1203,xx0A)	3	SQ	Refractive Surgery State Sequence	Refractive surgery state of a patient's eye at the time of measurement. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx0B)	1	CS	Refractive Procedure Occurred	Whether or not a patient has had refractive surgery. Enumerated Values: YES NO	ALWAYS	USER
>>(1203,xx0C)	2C	SQ	Refractive Surgery Type Code Sequence	Type of refractive surgery a patient has had. Zero or more items shall be included in this sequence. Required if the value of Refractive Procedure Occurred (1203,xx0B) is YES.	VNAP	USER
>>>(1203,xx0D)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>>(1203,xx0E)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>>(1203,xx10)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
(1203,xx02)	3	SQ	IOLMaster Clinical Patient Information Left Eye Sequence	Information used to represent ophthalmic clinical information during an ophthalmic measurement of a patient's right eye. Only a single item shall be included in this sequence. Required if Measurement Laterality (0024,0113) is R or B.	ANAP	AUTO
>(1203,xx03)	3	SQ	Refractive State Sequence	Refractive state of the measured eye at the time of acquisition. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx04)	1	FD	Sphere Power	Sphere value in diopters.	ALWAYS	USER
>>(1203,xx05)	1	FD	Cylinder Power	Cylinder value in diopters.	ALWAYS	USER
>>(1203,xx06)	1	FD	Cylinder Axis	Axis value in degrees.	ALWAYS	USER
>>(1203,xx07)	1	FD	Vertex Distance	Vertex distance in millimeters	ALWAYS	CONFIG
>(1203,xx08)	3	SQ	Visual Acuity Sequence	Visual acuity of a patient's eye at the time of measurement. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx09)	1	FD	Decimal Visual Acuity	A patient's visual acuity specified in decimal. See PS 3.17 Ophthalmic Refractive Reports Use Cases for guidance in converting Decimal Visual Acuity to other customarily used display notation such as 20/20 in the US and 6/6 in Britain.	ALWAYS	USER



>(1203,xx0A)	3	SQ	Refractive Surgery State Sequence	Refractive surgery state of a patient's eye at the time of measurement. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx0B)	1	CS	Refractive Procedure Occurred	Whether or not a patient has had refractive surgery. Enumerated Values: YES NO	ALWAYS	USER
>>(1203,xx0C)	2C	SQ	Refractive Surgery Type Code Sequence	Type of refractive surgery a patient has had. Zero or more items shall be included in this sequence. Required if the value of Refractive Procedure Occurred (1203,xx0B) is YES.	VNAP	USER
>>>(1203,xx0D)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>>(1203,xx0E)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>>(1203,xx10)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER

### 8.1.1.12 Keratometry Measurements Modules

**Table 8-39 Keratometry Measurements IOD - Module "Keratometry Measurements Series"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0060)	1	CS	Modality	Type of equipment that originally acquired the data used to create the images in this Series. Enumerated Values: KER See NEMA PS3.3 Section C.7.3.1.1 for further explanation.  Always "KER"	ALWAYS	AUTO

**Table 8-40 Keratometry Measurements IOD - Module "Keratometry Measurements"**

Tag	Type	VR	Name	Description	PoV	Source
(0046,0070)	1C	SQ	Keratometry Right Eye Sequence	A sequence that specifies keratometric measurements of a patient's right eye, defining principal meridians wherein the steepest meridian is separated by 90 degrees from the flattest. Only a single item shall be included in this sequence. Required if the right eye is measured. Note: Consideration for steep, flat, and spherical meridians is made. For instances where spherical keratometric measurements are obtained, values specified in the steep and flat Attributes are equivalent.	ANAP	AUTO
>(0046,0074)	1	SQ	Steep Keratometric Axis Sequence	A sequence that specifies the steepest meridian as defined by the greatest power of curvature and shortest radius of curvature. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO
>>(0046,0076)	1	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO
>>(0046,0077)	1	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ALWAYS	AUTO
>(0046,0080)	1	SQ	Flat Keratometric Axis Sequence	A sequence that specifies the flattest meridian as defined by the least power of curvature and longest radius of curvature. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO
>>(0046,0076)	1	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO

>>(0046,0077)	1	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ALWAYS	AUTO
(0046,0071)	1C	SQ	Keratometry Left Eye Sequence	A sequence that specifies keratometric measurements of a patient's left eye, defining principal meridians wherein the steepest meridian is separated by 90 degrees from the flattest. Only a single item shall be included in this sequence. Required if the left eye is measured. Note: See Note for attribute Keratometry Right Eye Sequence (0046,0070)	ANAP	AUTO
>(0046,0074)	1	SQ	Steep Keratometric Axis Sequence	A sequence that specifies the steepest meridian as defined by the greatest power of curvature and shortest radius of curvature. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO
>>(0046,0076)	1	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO
>>(0046,0077)	1	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ALWAYS	AUTO
>(0046,0080)	1	SQ	Flat Keratometric Axis Sequence	A sequence that specifies the flattest meridian as defined by the least power of curvature and longest radius of curvature. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO
>>(0046,0076)	1	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO
>>(0046,0077)	1	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ALWAYS	AUTO

**Table 8-41 Keratometry Measurements IOD - Module "Sop Common"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. See NEMA PS3.3 C.12.1.1.1 for further explanation. See also PS 3.4.  Always "1.2.840.10008.5.1.4.1.1.78.3"	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. See NEMA PS3.3 C.12.1.1.1 for further explanation. See also PS 3.4.  IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.11.1.3." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO

(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See PS3.3 C.12.1.1.2 for Defined Terms. See 6 Support of Character Sets.	ALWAYS	AUTO, CONFIG
(0008,0012)	3	DA	Instance Creation Date	Date the SOP Instance was created.	ALWAYS	AUTO
(0008,0013)	3	TM	Instance Creation Time	Time the SOP Instance was created.	ALWAYS	AUTO
(0018,A001)	3	SQ	Contributing Equipment Sequence	Sequence of Items containing descriptive attributes of related equipment which has contributed to the acquisition, creation or modification of the composite instance. One or more Items may be included in this Sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation. Sequence contains one single item defining the equipment which originally acquired the measurement data.	ALWAYS	AUTO
>(0040,A170)	1	SQ	Purpose of Reference Code Sequence	Describes the purpose for which the related equipment is being reference. Only a single Item shall be permitted in this sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1. Always "109101"	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Always "DCM"	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3. Always "Acquisition Equipment"	ALWAYS	AUTO
>(0008,0070)	1	LO	Manufacturer	Manufacturer of the equipment that contributed to the composite instance. Always "Carl Zeiss Meditec"	ALWAYS	AUTO
>(0008,0080)	3	LO	Institution Name	Institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Name is defined for contributing equipment.	ANAP	AUTO
>(0008,0081)	3	ST	Institution Address	Address of the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Address is defined for contributing equipment.	ANAP	AUTO
>(0008,1010)	3	SH	Station Name	User defined name identifying the machine that contributed to the composite instance.	ANAP	AUTO

					Attribute does not exist if no Station Name is defined for contributing equipment.		
>(0008,1040)	3	LO	Institutional Department Name		Department in the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institutional Department Name is defined for contributing equipment.	ANAP	AUTO
>(0008,1090)	3	LO	Manufacturer's Model Name		Manufacturer's model name of the equipment that contributed to the composite instance. Attribute does not exist if no Manufacturer's Model Name is defined for contributing equipment.	ANAP	AUTO
>(0018,1000)	3	LO	Device Serial Number		Manufacturer's serial number of the equipment that contributed to the composite instance. Attribute does not exist if no Device Serial Number is defined for contributing equipment.	ANAP	AUTO
>(0018,1020)	3	LO	Software Version(s)		Manufacturer's designation of the software version of the equipment that contributed to the composite instance. Attribute does not exist if no Software Version(s) is defined for contributing equipment.	ANAP	AUTO
>(0018,1200)	3	DA	Date of Last Calibration		Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Date of Last Calibration is defined for contributing equipment.	ANAP	AUTO
>(0018,1201)	3	TM	Time of Last Calibration		Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Time of Last Calibration is defined for contributing equipment.	ANAP	AUTO

**Table 8-42 Keratometry Measurements IOD - Module "CZM IOLM Keratometry Quality"**

Tag	Type	VR	Name	Description	PoV	Source
(1201,xx01)	3	SQ	IOLMaster Keratometry Quality Right Eye Sequence	A sequence that specifies additional quality information for keratometric measurements of a patient's right eye. Only a single item shall be included in this sequence. Sequence exists if the right eye quality is measured.	ANAP	AUTO
>(1201,xx03)	3	SQ	Extended Steep Keratometric Axis Sequence	A sequence that specifies extended measurement data for the steepest meridian as defined by the greatest power of curvature and shortest radius of curvature. Only a single item shall be included in this sequence.	ANAP	AUTO

>>(1201,xx05)	3	FD	Standard Deviation of Keratometry Measurement	The standard deviation of the corneal curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx04)	3	SQ	Extended Flat Keratometric Axis Sequence	A sequence that specifies extended measurement data for the flattest meridian as defined by the least power of curvature and longest radius of curvature. Only a single item shall be included in this sequence.	ANAP	AUTO
>>(1201,xx05)	3	FD	Standard Deviation of Keratometry Measurement	The standard deviation of the corneal curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx06)	3	CS	IOLMaster Quality Indicator	The IOLMaster quality indicator for the keratometry measurement. Enumerated values: SUCCESSFUL WARNING FAILED NONE Attribute only exists if IOLMaster quality metric has been applied.	ANAP	AUTO
>(1201,xx07)	3	FD	Standard Deviation of Spherical Equivalent	The standard deviation of spherical equivalent, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx1D)	1	SQ	Referenced Keratometry Measurement QC Image Sequence	Reference to the quality control image associated with this measurement. Only a single item shall be included in this sequence. The referenced image contains up to three frames each showing a synthesized digital subtraction image used for telecentric keratometry.	ALWAYS	AUTO
>>(1201,xx1E)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Enumerated Values: "1.2.840.10008.5.1.4.1.1.7.2" = Multi-frame Grayscale Byte Secondary Capture Image Storage "1.2.840.10008.5.1.4.1.1.7.4" = Multi-frame True Color Secondary Capture Image Storage  Always "1.2.840.10008.5.1.4.1.1.7.2"	ALWAYS	AUTO
>>(1201,xx1F)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO
(1201,xx02)	3	SQ	IOLMaster Keratometry Quality Left Eye Sequence	A sequence that specifies additional quality information for keratometric measurements of a patient's left eye. Only a single item shall be included in this sequence. Exists if the left eye quality is measured.	ANAP	AUTO

>(1201,xx03)	3	SQ	Extended Steep Keratometric Axis Sequence	A sequence that specifies extended measurement data for the steepest meridian as defined by the greatest power of curvature and shortest radius of curvature. Only a single item shall be included in this sequence.	ANAP	AUTO
>>(1201,xx05)	3	FD	Standard Deviation of Keratometry Measurement	The standard deviation of the corneal curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx04)	3	SQ	Extended Flat Keratometric Axis Sequence	A sequence that specifies extended measurement data for the flattest meridian as defined by the least power of curvature and longest radius of curvature. Only a single item shall be included in this sequence.	ANAP	AUTO
>>(1201,xx05)	3	FD	Standard Deviation of Keratometry Measurement	The standard deviation of the corneal curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx06)	3	CS	IOLMaster Quality Indicator	The IOLMaster quality indicator for the keratometry measurement. Enumerated values: SUCCESSFUL WARNING FAILED NONE Attribute only exists if IOLMaster quality metric has been applied.	ANAP	AUTO
>(1201,xx07)	3	FD	Standard Deviation of Spherical Equivalent	The standard deviation of spherical equivalent, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx1D)	1	SQ	Referenced Keratometry Measurement QC Image Sequence	Reference to the quality control image associated with this measurement. Only a single item shall be included in this sequence. The referenced image contains up to three frames each showing a synthesized digital subtraction image used for telecentric keratometry.	ALWAYS	AUTO
>>(1201,xx1E)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Enumerated Values: "1.2.840.10008.5.1.4.1.1.7.2" = Multi-frame Grayscale Byte Secondary Capture Image Storage "1.2.840.10008.5.1.4.1.1.7.4" = Multi-frame True Color Secondary Capture Image Storage  Always "1.2.840.10008.5.1.4.1.1.7.2"	ALWAYS	AUTO
>>(1201,xx1F)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO



**Table 8-43 Keratometry Measurements IOD - Module "CZM IOLM Posterior Cornea Surface Measurements"**

Tag	Type	VR	Name	Description	PoV	Source
(1201,xx08)	3	SQ	IOLMaster Posterior Cornea Surface Measurements Right Eye Sequence	A sequence that specifies information about posterior cornea surface (PCS) measurements of a patient's right eye. Only a single item shall be included in this sequence. Exists if the right eye's PCS is measured. <i>Note: These values require are a separate software license, which might not yet be available in your country due to regulatory reasons.</i>	ANAP	AUTO
>(1201,xx0A)	3	SQ	Steep Posterior Cornea Surface Sequence	A sequence that specifies the posterior cornea surface of the steepest meridian. Only a single item shall be included in this sequence.	ANAP	AUTO
>>(1201,xx0C)	3	FD	Posterior Radius of Curvature	The radius of curvature of the principal meridians of the posterior cornea, in millimeters.	ANAP	AUTO
>>(1201,xx0D)	3	FD	Posterior Keratometric Power	The refractive power of the posterior cornea at the principal meridians, in diopters.	ANAP	AUTO
>>(1201,xx0E)	3	FD	Posterior Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ANAP	AUTO
>>(1201,xx05)	3	FD	Standard Deviation of Keratometry Measurement	The standard deviation of the corneal curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx0B)	3	SQ	Flat Posterior Cornea Surface Sequence	A sequence that specifies the posterior cornea surface of the flattest meridian. Only a single item shall be included in this sequence.	ANAP	AUTO
>>(1201,xx0C)	3	FD	Posterior Radius of Curvature	The radius of curvature of the principal meridians of the posterior cornea, in millimeters.	ANAP	AUTO
>>(1201,xx0D)	3	FD	Posterior Keratometric Power	The refractive power of the posterior cornea at the principal meridians, in diopters.	ANAP	AUTO
>>(1201,xx0E)	3	FD	Posterior Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ANAP	AUTO
>>(1201,xx05)	3	FD	Standard Deviation of Keratometry Measurement	The standard deviation of the corneal curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO



>(1201,xx06)	3	CS	IOLMaster Quality Indicator	The IOLMaster quality indicator for the keratometry measurement. Enumerated values: SUCCESSFUL WARNING FAILED NONE Attribute only exists if IOLMaster quality metric has been applied.	ANAP	AUTO
>(1201,xx07)	3	FD	Standard Deviation of Spherical Equivalent	The standard deviation of spherical equivalent, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx1B)	3	FD	Index of Refraction of the Cornea	The index of refraction of the cornea used for posterior cornea surface analysis.	ALWAYS	CONFIG
>(1201,xx1C)	3	FD	Index of Refraction of the Aqueous Humor	The index of refraction of the aqueous humor used for posterior cornea surface analysis.	ALWAYS	CONFIG
(1201,xx09)	3	SQ	IOLMaster Posterior Cornea Surface Left Eye Sequence	A sequence that specifies information about posterior cornea surface (PCS) measurements of a patient's left eye. Only a single item shall be included in this sequence. Exists if the left eye's PCS is measured. <i>Note: These values require are a separate software license, which might not yet be available in your country due to regulatory reasons.</i>	ANAP	AUTO
>(1201,xx0A)	3	SQ	Steep Posterior Cornea Surface Sequence	A sequence that specifies the posterior cornea surface of the steepest meridian. Only a single item shall be included in this sequence.	ANAP	AUTO
>>(1201,xx0C)	3	FD	Posterior Radius of Curvature	The radius of curvature of the principal meridians of the posterior cornea, in millimeters.	ANAP	AUTO
>>(1201,xx0D)	3	FD	Posterior Keratometric Power	The refractive power of the posterior cornea at the principal meridians, in diopters.	ANAP	AUTO
>>(1201,xx0E)	3	FD	Posterior Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ANAP	AUTO
>>(1201,xx05)	3	FD	Standard Deviation of Keratometry Measurement	The standard deviation of the corneal curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx0B)	3	SQ	Flat Posterior Cornea Surface Sequence	A sequence that specifies the posterior cornea surface of the flattest meridian. Only a single item shall be included in this sequence.	ANAP	AUTO
>>(1201,xx0C)	3	FD	Posterior Radius of Curvature	The radius of curvature of the principal meridians of the posterior cornea, in millimeters.	ANAP	AUTO

>>(1201,xx0D)	3	FD	Posterior Keratometric Power	The refractive power of the posterior cornea at the principal meridians, in diopters.	ANAP	AUTO
>>(1201,xx0E)	3	FD	Posterior Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ANAP	AUTO
>>(1201,xx05)	3	FD	Standard Deviation of Keratometry Measurement	The standard deviation of the corneal curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx06)	3	CS	IOLMaster Quality Indicator	The IOLMaster quality indicator for the keratometry measurement. Enumerated values: SUCCESSFUL WARNING FAILED NONE Attribute only exists if IOLMaster quality metric has been applied.	ANAP	AUTO
>(1201,xx07)	3	FD	Standard Deviation of Spherical Equivalent	The standard deviation of spherical equivalent, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx1B)	3	FD	Index of Refraction of the Cornea	The index of refraction of the cornea used for posterior cornea surface analysis.	ALWAYS	CONFIG
>(1201,xx1C)	3	FD	Index of Refraction of the Aqueous Humor	The index of refraction of the aqueous humor used for posterior cornea surface analysis.	ALWAYS	CONFIG

**Table 8-44 Keratometry Measurements IOD - Module "CZM IOLM Total Keratometry Measurements"**

Tag	Type	VR	Name	Description	PoV	Source
(1201,xx0F)	3	SQ	IOLMaster Total Keratometry Right Eye Sequence	A sequence that specifies information about total keratometry measurements of a patient's right eye. Only a single item shall be included in this sequence. Exists if the right eye's total keratometry has been acquired. <i>Note: These values require a separate software license, which might not yet be available in your country due to regulatory reasons.</i>	ANAP	AUTO
>(1201,xx11)	3	SQ	Steep Total Keratometry Sequence	A sequence that specifies the total keratometry of the steepest meridian. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(1201,xx13)	3	FD	Total Keratometry Radius of Curvature	Keratometer equivalent virtual radius of curvature of the principal meridians of the cornea, in millimeters.	ALWAYS	AUTO
>>(1201,xx14)	3	FD	Total Keratometry Power	The total keratometry power of the cornea at the principal meridians, in diopters.	ALWAYS	AUTO

>>(1201,xx15)	3	FD	Total Keratometry Axis	The meridian where the total keratometry power is measured, in degrees.	ALWAYS	AUTO
>>(1201,xx16)	3	FD	Standard Deviation of Total Keratometry	The standard deviation of the total keratometry curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx12)	3	SQ	Flat Total Keratometry Sequence	A sequence that specifies the total keratometry of the flattest meridian. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(1201,xx13)	3	FD	Total Keratometry Radius of Curvature	Keratometer equivalent virtual radius of curvature of the principal meridians of the cornea, in millimeters.	ALWAYS	AUTO
>>(1201,xx14)	3	FD	Total Keratometry Power	The total keratometry power of the cornea at the principal meridians, in diopters.	ALWAYS	AUTO
>>(1201,xx15)	3	FD	Total Keratometry Axis	The meridian where the total keratometry power is measured, in degrees.	ALWAYS	AUTO
>>(1201,xx16)	3	FD	Standard Deviation of Total Keratometry	The standard deviation of the total keratometry curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx06)	3	CS	IOLMaster Quality Indicator	The IOLMaster quality indicator for this corneal measurement. Enumerated values: SUCCESSFUL WARNING FAILED NONE Attribute only exists if IOLMaster quality metric has been applied.	ANAP	AUTO
>(1201,xx17)	3	FD	Standard Deviation of Total Keratometry Spherical Equivalent	The standard deviation of the spherical equivalent for the total keratometry measurement, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
(1201,xx10)	3	SQ	IOLMaster Total Keratometry Left Eye Sequence	A sequence that specifies information about total keratometry measurements of a patient's left eye. Only a single item shall be included in this sequence. Exists if the left eye's total keratometry has been acquired. <i>Note: These values require are a separate software license, which might not yet be available in your country due to regulatory reasons.</i>	ANAP	AUTO
>(1201,xx11)	3	SQ	Steep Total Keratometry Sequence	A sequence that specifies the total keratometry of the steepest meridian. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(1201,xx13)	3	FD	Total Keratometry Radius of Curvature	Keratometer equivalent virtual radius of curvature of the principal meridians of the cornea, in millimeters.	ALWAYS	AUTO
>>(1201,xx14)	3	FD	Total Keratometry Power	The total keratometry power of the cornea at the principal meridians, in diopters.	ALWAYS	AUTO
>>(1201,xx15)	3	FD	Total Keratometry Axis	The meridian where the total keratometry power is measured, in degrees.	ALWAYS	AUTO

>>(1201,xx16)	3	FD	Standard Deviation of Total Keratometry	The standard deviation of the total keratometry curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx12)	3	SQ	Flat Total Keratometry Sequence	A sequence that specifies the total keratometry of the flattest meridian. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(1201,xx13)	3	FD	Total Keratometry Radius of Curvature	Keratometer equivalent virtual radius of curvature of the principal meridians of the cornea, in millimeters.	ALWAYS	AUTO
>>(1201,xx14)	3	FD	Total Keratometry Power	The total keratometry power of the cornea at the principal meridians, in diopters.	ALWAYS	AUTO
>>(1201,xx15)	3	FD	Total Keratometry Axis	The meridian where the total keratometry power is measured, in degrees.	ALWAYS	AUTO
>>(1201,xx16)	3	FD	Standard Deviation of Total Keratometry	The standard deviation of the total keratometry curvature, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO
>(1201,xx06)	3	CS	IOLMaster Quality Indicator	The IOLMaster quality indicator for this corneal measurement. Enumerated values: SUCCESSFUL WARNING FAILED NONE Attribute only exists if IOLMaster quality metric has been applied.	ANAP	AUTO
>(1201,xx17)	3	FD	Standard Deviation of Total Keratometry Spherical Equivalent	The standard deviation of the spherical equivalent for the total keratometry measurement, in millimeters. Attribute only exists if this quality metric has been applied.	ANAP	AUTO

**Table 8-45 Keratometry Measurements IOD - Module "CZM IOLM Clinical Patient Information"**

Tag	Type	VR	Name	Description	PoV	Source
(1203,xx01)	3	SQ	IOLMaster Clinical Patient Information Right Eye Sequence	Information used to represent ophthalmic clinical information during an ophthalmic measurement of a patient's right eye. Only a single item shall be included in this sequence. Required if Measurement Laterality (0024,0113) is R or B.	ANAP	AUTO
>(1203,xx03)	3	SQ	Refractive State Sequence	Refractive state of the measured eye at the time of acquisition. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx04)	1	FD	Sphere Power	Sphere value in diopters.	ALWAYS	USER
>>(1203,xx05)	1	FD	Cylinder Power	Cylinder value in diopters.	ALWAYS	USER
>>(1203,xx06)	1	FD	Cylinder Axis	Axis value in degrees.	ALWAYS	USER

>>(1203,xx07)	1	FD	Vertex Distance	Vertex distance in millimeters	ALWAYS	CONFIG
>(1203,xx08)	3	SQ	Visual Acuity Sequence	Visual acuity of a patient's eye at the time of measurement. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx09)	1	FD	Decimal Visual Acuity	A patient's visual acuity specified in decimal. See PS 3.17 Ophthalmic Refractive Reports Use Cases for guidance in converting Decimal Visual Acuity to other customarily used display notation such as 20/20 in the US and 6/6 in Britain.	ALWAYS	USER
>(1203,xx0A)	3	SQ	Refractive Surgery State Sequence	Refractive surgery state of a patient's eye at the time of measurement. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx0B)	1	CS	Refractive Procedure Occurred	Whether or not a patient has had refractive surgery. Enumerated Values: YES NO	ALWAYS	USER
>>(1203,xx0C)	2C	SQ	Refractive Surgery Type Code Sequence	Type of refractive surgery a patient has had. Zero or more items shall be included in this sequence. Required if the value of Refractive Procedure Occurred (1203,xx0B) is YES.	VNAP	USER
>>>(1203,xx0D)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>>(1203,xx0E)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>>(1203,xx10)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
(1203,xx02)	3	SQ	IOLMaster Clinical Patient Information Left Eye Sequence	Information used to represent ophthalmic clinical information during an ophthalmic measurement of a patient's right eye. Only a single item shall be included in this sequence. Required if Measurement Laterality (0024,0113) is R or B.	ANAP	AUTO
>(1203,xx03)	3	SQ	Refractive State Sequence	Refractive state of the measured eye at the time of acquisition. Only one item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx04)	1	FD	Sphere Power	Sphere value in diopters.	ALWAYS	USER
>>(1203,xx05)	1	FD	Cylinder Power	Cylinder value in diopters.	ALWAYS	USER
>>(1203,xx06)	1	FD	Cylinder Axis	Axis value in degrees.	ALWAYS	USER
>>(1203,xx07)	1	FD	Vertex Distance	Vertex distance in millimeters	ALWAYS	CONFIG

>(1203,xx08)	3	SQ	Visual Acuity Sequence	Visual acuity of a patient's eye at the time of measurement. Only one Item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx09)	1	FD	Decimal Visual Acuity	A patient's visual acuity specified in decimal. See PS 3.17 Ophthalmic Refractive Reports Use Cases for guidance in converting Decimal Visual Acuity to other customarily used display notation such as 20/20 in the US and 6/6 in Britain.	ALWAYS	USER
>(1203,xx0A)	3	SQ	Refractive Surgery State Sequence	Refractive surgery state of a patient's eye at the time of measurement. Only one Item shall be included in this sequence.	ANAP	AUTO
>>(1203,xx0B)	1	CS	Refractive Procedure Occurred	Whether or not a patient has had refractive surgery. Enumerated Values: YES NO	ALWAYS	USER
>>(1203,xx0C)	2C	SQ	Refractive Surgery Type Code Sequence	Type of refractive surgery a patient has had. Zero or more Items shall be included in this sequence. Required if the value of Refractive Procedure Occurred (1203,xx0B) is YES.	VNAP	USER
>>>(1203,xx0D)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>>(1203,xx0E)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>>(1203,xx10)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER

### 8.1.1.13 Intraocular Lens Calculations Modules

**Table 8-46 Intraocular Lens Calculations IOD - Module "Intraocular Lens Calculations Series"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0060)	1	CS	Modality	Type of equipment that originally acquired the data used to create the images in this Series. Enumerated Values: IOL See NEMA PS3.3 Section C.7.3.1.1.1 for further explanation.  Always "IOL"	ALWAYS	AUTO

**Table 8-47 Intraocular Lens Calculations IOD - Module "Intraocular Lens Calculations"**

Tag	Type	VR	Name	Description	PoV	Source
(0022,1300)	1C	SQ	Intraocular Lens Calculations Right Eye Sequence	Calculations of intraocular lens power for a patient's right eye. One or more Items shall be included in this sequence. Required if the device calculated intraocular lens power for the right eye. Note If Intraocular Lens Calculations Right Eye Sequence (0022,1300) is present, Measurement Laterality (0024,0113), if present, will have a value of R or B as appropriate.	ANAP	AUTO
>(0022,1037)	1	FL	Target Refraction	The desired postoperative refractive error, in diopters.	ALWAYS	USER
>(0022,1039)	2	CS	Refractive Procedure Occurred	Whether or not a patient has had refractive surgery. Enumerated Values: YES NO	VNAP	USER
>(0022,1040)	2C	SQ	Refractive Surgery Type Code Sequence	Type of refractive surgery a patient has had. Zero or more Items shall be included in this sequence. Required if the value of Refractive Procedure Occurred (0022,1039) is YES.	ANAP	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER



>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>(0022,1103)	2C	SQ	Refractive Error Before Refractive Surgery Code Sequence	The patient's refractive error before any of the refractive surgeries listed in Refractive Surgery Type Code Sequence (0022,1040) were performed. Zero or one Item shall be included in this sequence. Required if the value of Refractive Procedure Occurred (0022,1039) is YES.	ANAP	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-82 Coded Values - Refractive Error Types	ALWAYS	USER
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-82 Coded Values - Refractive Error Types	ALWAYS	USER
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-82 Coded Values - Refractive Error Types	ALWAYS	USER
>(0046,0047)	3	SQ	Corneal Size Sequence	Corneal Size value and source. Only a single Item is permitted in this Sequence.	ANAP	AUTO
>>(0046,0046)	1	FL	Corneal Size	The horizontal diameter measurement of the cornea, in mm.	ALWAYS	AUTO, USER
>>(0022,1036)	1	SQ	Source of Corneal Size Data Code Sequence	Source of the value of Corneal Size (0046,0046). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0022,1127)	3	SQ	Lens Thickness Sequence	Lens thickness value and source. Only a single Item is permitted in this sequence.	ANAP	AUTO
>>(0022,1130)	1	FL	Lens Thickness	The value for axial length of the lens in a patient's eye, in mm.	ALWAYS	AUTO, USER



>>(0022,1132)	1	SQ	Source of Lens Thickness Data Code Sequence	Source of the value of Lens Thickness (0022,1130). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0022,1128)	3	SQ	Anterior Chamber Depth Sequence	Anterior chamber depth value and source. Only a single Item is permitted in this sequence.	ANAP	AUTO
>>(0022,1131)	1	FL	Anterior Chamber Depth	The value for axial length of the anterior chamber, in mm.	ALWAYS	AUTO, USER
>>(0022,1133)	1	SQ	Source of Anterior Chamber Depth Data Code Sequence	Source of the value of Anterior Chamber Depth (0022,1131). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0022,001B)	2	SQ	Refractive State Sequence	Refractive state of the imaged eye at the time of acquisition. Zero or one Item shall be included in this sequence.	VNAP	AUTO
>>(0022,0007)	1	FL	Spherical Lens Power	Sphere value in diopters.	ALWAYS	USER
>>(0022,0008)	1	FL	Cylinder Lens Power	Cylinder value in diopters.	ALWAYS	USER
>>(0022,0009)	1	FL	Cylinder Axis	Axis value in degrees.	ALWAYS	USER

>>(0022,1134)	1	SQ	Source of Refractive Measurements Sequence	Refractive measurements source. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>>(0022,1135)	1	SQ	Source of Refractive Measurements Code Sequence	Source of values in Refractive State Sequence (0022,101B). Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0046,0074)	1	SQ	Steep Keratometric Axis Sequence	Steepest meridian as defined by the greatest power of curvature and shortest radius of curvature. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO, USER
>>(0046,0076)	2	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO, USER
>>(0046,0077)	2	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ALWAYS	AUTO, USER
>(0046,0080)	1	SQ	Flat Keratometric Axis Sequence	Flattest meridian as defined by the least power of curvature and longest radius of curvature. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO, USER
>>(0046,0076)	2	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO, USER
>>(0046,0077)	2	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ALWAYS	AUTO, USER

>(0022,1096)	2	SQ	Keratometry Measurement Type Code Sequence	Descriptors relevant to keratometry data. Zero or one Item shall be included in this sequence.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-79 Coded Values - Keratometry Descriptors	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-79 Coded Values - Keratometry Descriptors	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-79 Coded Values - Keratometry Descriptors	ALWAYS	AUTO
>(0022,1033)	2	FL	Keratometer Index	The translation factor specific to each keratometer that derives a number for power from the measured radius of curvature of the cornea.	ALWAYS	AUTO, CONFIG
>(0046,0110)	3	SQ	Cornea Measurements Sequence	Cornea measurement values and source. One or more Items are permitted in this Sequence.	ALWAYS	AUTO
>>(0046,0112)	1	SQ	Steep Corneal Axis Sequence	Steepest meridian as defined by the greatest power of curvature and shortest radius of curvature. Only a single Item shall be included in this Sequence.	ALWAYS	AUTO
>>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO
>>>(0046,0114)	2	FD	Corneal Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO
>>>(0046,0115)	2	FD	Corneal Axis	The meridian where the radius of curvature or corneal power is measured, in degrees.	ALWAYS	AUTO
>>(0046,0113)	1	SQ	Flat Corneal Axis Sequence	Flattest meridian as defined by the least power of curvature and longest radius of curvature. Only a single Item shall be included in this Sequence.	ALWAYS	AUTO
>>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO
>>>(0046,0114)	2	FD	Corneal Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO
>>>(0046,0115)	2	FD	Corneal Axis	The meridian where the radius of curvature or corneal power is measured, in degrees.	ALWAYS	AUTO
>>(0046,0116)	1	SQ	Cornea Measurement Method Code Sequence	Method of the cornea measurement. Only a single Item shall be included in this Sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-86 Coded Values - Cornea Measurement Method Descriptors	ALWAYS	AUTO

>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-86 Coded Values - Cornea Measurement Method Descriptors	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-86 Coded Values - Cornea Measurement Method Descriptors	ALWAYS	AUTO
>>(0022,1033)	2	FL	Keratometer Index	The translation factor specific to each keratometer that derives a number for power from the measured radius of curvature of the cornea.	ALWAYS	AUTO, CONFIG
>>(0046,0117)	1C	FL	Refractive Index of Cornea	The refractive translation factor specific for the cornea when deriving a number of power from the measured radius of curvature of the posterior surface of cornea. Required if Cornea Measurement Type Code Sequence (0046,0116) contains an item with the value (DCM, 111759, "Posterior Cornea Surface Measurement")	ANAP	AUTO, CONFIG
>>(0046,0118)	1C	FL	Refractive Index of Aqueous Humor	The refractive translation factor specific for the aqueous humor when deriving a number of power from the measured radius of curvature of the posterior surface of cornea. Required if Cornea Measurement Type Code Sequence (0046,0116) contains an item with the value (DCM, 111759, "Posterior Cornea Surface Measurement")	ANAP	AUTO, CONFIG
>>(0046,0111)	1	SQ	Source of Cornea Measurement Data Code Sequence	Source of the values of Steep Corneal Axis Sequence (0046,0112) and Flat Corneal Axis Sequence (0046,0113). Only a single item shall be included in this Sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0022,1028)	1	SQ	IOL Formula Code Sequence	Formula used to calculate IOL power. Only a single item shall be included in this sequence.	ALWAYS	USER
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-80 Coded Values - IOL Calculation Formula	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-80 Coded Values - IOL Calculation Formula	ALWAYS	AUTO

>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-80 Coded Values - IOL Calculation Formula	ALWAYS	AUTO
>(0022,1012)	1	SQ	Ophthalmic Axial Length Sequence	Axial length value and source that was used in calculation of IOL power. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length of a patient's eye, in mm, that was used in calculation of IOL power.	ALWAYS	AUTO, USER
>>(0022,1250)	1	SQ	Ophthalmic Axial Length Selection Method Code Sequence	Method used to select the value recorded in Ophthalmic Axial Length (0022,1019). Only a single item shall be included in this sequence.	ALWAYS	AUTO, USER
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-85 Coded Values - Ophthalmic Axial Length Selection Method	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-85 Coded Values - Ophthalmic Axial Length Selection Method	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-85 Coded Values - Ophthalmic Axial Length Selection Method	ALWAYS	AUTO
>>(0022,1035)	1	SQ	Source of Ophthalmic Axial Length Code Sequence	Source of the value of Ophthalmic Axial Length (0022,1019). Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0022,1045)	3	SQ	Surgically Induced Astigmatism Sequence	The astigmatism that is expected to be induced by corneal incisions during cataract surgery. Only a single item is permitted in this Sequence.	ANAP	USER
>>(0046,0147)	1	FD	Cylinder Power	The cylinder power, in diopters.	ALWAYS	USER
>>(0022,0009)	1	FL	Cylinder Axis	The cylinder axis, in degrees.	ALWAYS	USER

>(0022,1093)	1	LO	IOL Manufacturer	Name of the manufacturer that produced the lens.	ALWAYS	USER
>(0022,1095)	1	LO	Implant Name	The (product) name of the lens.	ALWAYS	USER
>(0022,1046)	3	CS	Type of Optical Correction	Type of the optical correction achieved by the IOL. Enumerated Values: SPHERICAL TORIC	ALWAYS	AUTO
>(0022,1092)	1	SQ	Lens Constant Sequence	Constants used in calculation of intraocular lens power. These constants are a characteristic of the model of intraocular lens being considered for use in cataract surgery. One or more items shall be included in this sequence.	ALWAYS	AUTO
>>(0040,A043)	1	SQ	Concept Name Code Sequence	Constant type used in calculation of intraocular lens power. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-81 Coded Values - Lens Constant Type	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-81 Coded Values - Lens Constant Type	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-81 Coded Values - Lens Constant Type	ALWAYS	AUTO
>>(0040,A30A)	1	DS	Numeric Value	The value of the constant used.	ALWAYS	AUTO
>(0022,1090)	1	SQ	IOL Power Sequence	Information needed to select the intraocular lens power for cataract surgery. One or more items shall be included in this sequence.	ALWAYS	AUTO
>>(0022,1053)	1	FL	IOL Power	The intraocular lens power, in diopters. If Type of Optical Correction (0022,1046) is TORIC, this value represents the spherical equivalent of the toric intraocular lens power.	ALWAYS	AUTO
>>(0022,1047)	1C	SQ	Toric IOL Power Sequence	The toric intraocular lens power. Only a single item shall be included in this Sequence. Required if Type of Optical Correction (0022,1046) is TORIC.	ANAP	AUTO
>>>(0046,0146)	3	FD	Sphere Power	The calculated spherical power, in diopters.	ANAP	AUTO
>>>(0046,0147)	1	FD	Cylinder Power	The calculated cylinder power, in diopters.	ALWAYS	AUTO
>>>(0022,0009)	1	FL	Cylinder Axis	The calculated cylinder axis, in degrees.	ALWAYS	AUTO

>>(0022,1054)	1	FL	Predicted Refractive Error	The predicted postoperative refractive error (i.e. amount of near or far sightedness), in diopters.	ALWAYS	AUTO
>>(0022,1048)	1C	SQ	Predicted Toric Error Sequence	The predicted postoperative toric error. Only a single Item shall be included in this Sequence. Required if Type of Optical Correction (0022,1046) is TORIC.	ANAP	AUTO
>>>(0046,0146)	3	FD	Sphere Power	The calculated spherical power, in diopters.	ANAP	AUTO
>>>(0046,0147)	1	FD	Cylinder Power	The calculated cylinder power, in diopters.	ALWAYS	AUTO
>>>(0022,0009)	1	FL	Cylinder Axis	The calculated cylinder axis, in degrees.	ALWAYS	AUTO
>>(0022,1097)	2	LO	Implant Part Number	The (product) identifier of the lens.	VNAP	AUTO
>>(0022,1049)	3	CS	Pre-Selected for Implantation	Indicates, whether the intraocular lens specified by this sequence item has been pre-selected for implantation or not. Enumerated Values: YES NO Only one Item in IOL Power Sequence (0022,1090) shall contain the value YES.	ALWAYS	USER
>(0022,1121)	2	FL	IOL Power For Exact Emmetropia	The IOL power that would be required to achieve exact emmetropia, or no need for glasses at distance after surgery, in diopters.	VNAP	AUTO
>(0022,104A)	2C	SQ	Toric IOL Power for Exact Emmetropia Sequence	The toric IOL power that would be required to achieve exact emmetropia. Zero or one Item shall be included in this Sequence. Required if Type of Optical Correction (0022,1046) is TORIC.	ANAP	AUTO
>>(0046,0146)	3	FD	Sphere Power	The calculated spherical power, in diopters.	ANAP	AUTO
>>(0046,0147)	1	FD	Cylinder Power	The calculated cylinder power, in diopters.	ALWAYS	AUTO
>>(0022,0009)	1	FL	Cylinder Axis	The calculated cylinder axis, in degrees.	ALWAYS	AUTO
>(0022,1122)	2	FL	IOL Power For Exact Target Refraction	The IOL power that would be required to exactly achieve the Target Refraction (0022,1037), in diopters.	EMPTY	AUTO
>(0022,104B)	2C	SQ	Toric IOL Power for Exact Target Refraction Sequence	The toric IOL power that would be required to exactly achieve Target Refraction (0022,1037). Zero or one Item shall be included in this Sequence. Required if Type of Optical Correction (0022,1046) is TORIC.	ANAP	AUTO

>>(0046,0146)	3	FD	Sphere Power	The calculated spherical power, in diopters.	ANAP	AUTO
>>(0046,0147)	1	FD	Cylinder Power	The calculated cylinder power, in diopters.	ALWAYS	AUTO
>>(0022,0009)	1	FL	Cylinder Axis	The calculated cylinder axis, in degrees.	ALWAYS	AUTO
>(0022,112A)	3	SQ	Calculation Comment Sequence	Comment, hints or warnings related to the intraocular lens calculation(s). One or more items are permitted in this Sequence.	ANAP	AUTO
>>(0022,112B)	3	CS	Calculation Comment Type	The type of the Calculation Comment (0022,112C). Defined Terms: INFORMATIVE WARNING	ALWAYS	AUTO
>>(0022,112C)	3	LT	Calculation Comment	Comment related to the intraocular lens calculation(s).	ALWAYS	AUTO
(0022,1310)	1C	SQ	Intraocular Lens Calculations Left Eye Sequence	Calculations of intraocular lens power for a patient's left eye. One or more items shall be included in this sequence. Required if the device calculated intraocular lens power for the left eye. Note If Intraocular Lens Calculations Left Eye Sequence (0022,1310) is present, Measurement Laterality (0024,0113), if present, will have a value of L or B as appropriate.	ANAP	AUTO
>(0022,1037)	1	FL	Target Refraction	The desired postoperative refractive error, in diopters.	ALWAYS	USER
>(0022,1039)	2	CS	Refractive Procedure Occurred	Whether or not a patient has had refractive surgery. Enumerated Values: YES NO	VNAP	USER
>(0022,1040)	2C	SQ	Refractive Surgery Type Code Sequence	Type of refractive surgery a patient has had. Zero or more items shall be included in this sequence. Required if the value of Refractive Procedure Occurred (0022,1039) is YES.	ANAP	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER



>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-78 Coded Values - Refractive Surgery Types	ALWAYS	USER
>(0022,1103)	2C	SQ	Refractive Error Before Refractive Surgery Code Sequence	The patient's refractive error before any of the refractive surgeries listed in Refractive Surgery Type Code Sequence (0022,1040) were performed. Zero or one Item shall be included in this sequence. Required if the value of Refractive Procedure Occurred (0022,1039) is YES.	ANAP	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-82 Coded Values - Refractive Error Types	ALWAYS	USER
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-82 Coded Values - Refractive Error Types	ALWAYS	USER
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-82 Coded Values - Refractive Error Types	ALWAYS	USER
>(0046,0046)	3	FD	Corneal Size	The horizontal diameter measurement of the cornea, in mm.	ANAP	AUTO, USER
>(0022,1127)	3	SQ	Lens Thickness Sequence	Lens thickness value and source. Only a single Item is permitted in this sequence.	ANAP	AUTO
>>(0022,1130)	1	FL	Lens Thickness	The value for axial length of the lens in a patient's eye, in mm.	ALWAYS	AUTO, USER
>>(0022,1132)	1	SQ	Source of Lens Thickness Data Code Sequence	Source of the value of Lens Thickness (0022,1130). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0022,1128)	3	SQ	Anterior Chamber Depth Sequence	Anterior chamber depth value and source. Only a single Item is permitted in this sequence.	ANAP	AUTO

>>(0022,1131)	1	FL	Anterior Chamber Depth	The value for axial length of the anterior chamber, in mm.	ALWAYS	AUTO, USER
>>(0022,1133)	1	SQ	Source of Anterior Chamber Depth Data Code Sequence	Source of the value of Anterior Chamber Depth (0022,1131). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0022,001B)	2	SQ	Refractive State Sequence	Refractive state of the imaged eye at the time of acquisition. Zero or one Item shall be included in this sequence.	VNAP	AUTO
>>(0022,0007)	1	FL	Spherical Lens Power	Sphere value in diopters.	ALWAYS	USER
>>(0022,0008)	1	FL	Cylinder Lens Power	Cylinder value in diopters.	ALWAYS	USER
>>(0022,0009)	1	FL	Cylinder Axis	Axis value in degrees.	ALWAYS	USER
>>(0022,1134)	1	SQ	Source of Refractive Measurements Sequence	Refractive measurements source. Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>(0022,1135)	1	SQ	Source of Refractive Measurements Code Sequence	Source of values in Refractive State Sequence (0022,101B). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO

>(0046,0074)	1	SQ	Steepest Keratometric Axis Sequence	Steepest meridian as defined by the greatest power of curvature and shortest radius of curvature. Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO, USER
>>(0046,0076)	2	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO, USER
>>(0046,0077)	2	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ALWAYS	AUTO, USER
>(0046,0080)	1	SQ	Flat Keratometric Axis Sequence	Flattest meridian as defined by the least power of curvature and longest radius of curvature. Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO, USER
>>(0046,0076)	2	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO, USER
>>(0046,0077)	2	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ALWAYS	AUTO, USER
>(0022,1096)	2	SQ	Keratometry Measurement Type Code Sequence	Descriptors relevant to keratometry data. Zero or one Item shall be included in this sequence.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-79 Coded Values - Keratometry Descriptors	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-79 Coded Values - Keratometry Descriptors	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-79 Coded Values - Keratometry Descriptors	ALWAYS	AUTO
>(0022,1033)	2	FL	Keratometer Index	The translation factor specific to each keratometer that derives a number for power from the measured radius of curvature of the cornea.	ALWAYS	AUTO, CONFIG
>(0046,0110)	3	SQ	Cornea Measurements Sequence	Cornea measurement values and source. One or more Items are permitted in this Sequence.	ALWAYS	AUTO

>>(0046,0112)	1	SQ	Steepest Corneal Axis Sequence	Steepest meridian as defined by the greatest power of curvature and shortest radius of curvature. Only a single item shall be included in this Sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO
>>(0046,0114)	2	FD	Corneal Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO
>>(0046,0115)	2	FD	Corneal Axis	The meridian where the radius of curvature or corneal power is measured, in degrees.	ALWAYS	AUTO
>>(0046,0113)	1	SQ	Flat Corneal Axis Sequence	Flattest meridian as defined by the least power of curvature and longest radius of curvature. Only a single item shall be included in this Sequence.	ALWAYS	AUTO
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ALWAYS	AUTO
>>(0046,0114)	2	FD	Corneal Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ALWAYS	AUTO
>>(0046,0115)	2	FD	Corneal Axis	The meridian where the radius of curvature or corneal power is measured, in degrees.	ALWAYS	AUTO
>>(0046,0116)	1	SQ	Cornea Measurement Method Code Sequence	Method of the cornea measurement. Only a single item shall be included in this Sequence.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-86 Coded Values - Cornea Measurement Method Descriptors	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-86 Coded Values - Cornea Measurement Method Descriptors	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-86 Coded Values - Cornea Measurement Method Descriptors	ALWAYS	AUTO
>>(0022,1033)	2	FL	Keratometer Index	The translation factor specific to each keratometer that derives a number for power from the measured radius of curvature of the cornea.	ALWAYS	AUTO, CONFIG
>>(0046,0117)	1C	FL	Refractive Index of Cornea	The refractive translation factor specific for the cornea when deriving a number of power from the measured radius of curvature of the posterior surface of cornea. Required if Cornea Measurement Type Code Sequence (0046,0116) contains an item with the value (DCM, 111759, "Posterior Cornea Surface Measurement")	ANAP	AUTO, CONFIG
>>(0046,0118)	1C	FL	Refractive Index of Aqueous Humor	The refractive translation factor specific for the aqueous humor when deriving a number of power from the measured radius of curvature of the posterior surface of cornea. Required if Cornea Measurement Type Code Sequence (0046,0116) contains an item with the value (DCM, 111759, "Posterior Cornea Surface Measurement")	ANAP	AUTO, CONFIG

>>(0046,0111)	1	SQ	Source of Cornea Measurement Data Code Sequence	Source of the values of Steep Corneal Axis Sequence (0046,0112) and Flat Corneal Axis Sequence (0046,0113). Only a single item shall be included in this Sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0022,1028)	1	SQ	IOL Formula Code Sequence	Formula used to calculate IOL power. Only a single item shall be included in this sequence.	ALWAYS	USER
>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-80 Coded Values - IOL Calculation Formula	ALWAYS	AUTO
>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-80 Coded Values - IOL Calculation Formula	ALWAYS	AUTO
>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-80 Coded Values - IOL Calculation Formula	ALWAYS	AUTO
>(0022,1012)	1	SQ	Ophthalmic Axial Length Sequence	Axial length value and source that was used in calculation of IOL power. Only a single item shall be included in this sequence.	ALWAYS	AUTO
>>(0022,1019)	1	FL	Ophthalmic Axial Length	The axial length of a patient's eye, in mm, that was used in calculation of IOL power.	ALWAYS	AUTO, USER
>>(0022,1250)	1	SQ	Ophthalmic Axial Length Selection Method Code Sequence	Method used to select the value recorded in Ophthalmic Axial Length (0022,1019). Only a single item shall be included in this sequence.	ALWAYS	AUTO, USER
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-85 Coded Values - Ophthalmic Axial Length Selection Method	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-85 Coded Values - Ophthalmic Axial Length Selection Method	ALWAYS	AUTO

>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-85 Coded Values - Ophthalmic Axial Length Selection Method	ALWAYS	AUTO
>>(0022,1035)	1	SQ	Source of Ophthalmic Axial Length Code Sequence	Source of the value of Ophthalmic Axial Length (0022,1019). Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates -Table 8-84 Coded Values - Ophthalmic Measurement or Calculation Data Source	ALWAYS	AUTO
>(0022,1045)	3	SQ	Surgically Induced Astigmatism Sequence	The astigmatism that is expected to be induced by corneal incisions during cataract surgery. Only a single Item is permitted in this Sequence.	ANAP	USER
>>(0046,0147)	1	FD	Cylinder Power	The cylinder power, in diopters.	ALWAYS	USER
>>(0022,0009)	1	FL	Cylinder Axis	The cylinder axis, in degrees.	ALWAYS	USER
>(0022,1093)	1	LO	IOL Manufacturer	Name of the manufacturer that produced the lens.	ALWAYS	USER
>(0022,1095)	1	LO	Implant Name	The (product) name of the lens.	ALWAYS	USER
>(0022,1046)	3	CS	Type of Optical Correction	Type of the optical correction achieved by the IOL. Enumerated Values: SPHERICAL TORIC	ALWAYS	AUTO
>(0022,1092)	1	SQ	Lens Constant Sequence	Constants used in calculation of intraocular lens power. These constants are a characteristic of the model of intraocular lens being considered for use in cataract surgery. One or more Items shall be included in this sequence.	ALWAYS	AUTO
>>(0040,A043)	1	SQ	Concept Name Code Sequence	Constant type used in calculation of intraocular lens power. Only a single Item shall be included in this sequence.	ALWAYS	AUTO
>>>(0008,0100)	1	SH	Code Value	For possible values see section 8.3 Coded Terminology And Templates - Table 8-81 Coded Values - Lens Constant Type	ALWAYS	AUTO

>>>(0008,0102)	1	SH	Coding Scheme Designator	For possible values see section 8.3 Coded Terminology And Templates - Table 8-81 Coded Values - Lens Constant Type	ALWAYS	AUTO
>>>(0008,0104)	1	LO	Code Meaning	For possible values see section 8.3 Coded Terminology And Templates - Table 8-81 Coded Values - Lens Constant Type	ALWAYS	AUTO
>>(0040,A30A)	1	DS	Numeric Value	The value of the constant used.	ALWAYS	AUTO
>(0022,1090)	1	SQ	IOL Power Sequence	Information needed to select the intraocular lens power for cataract surgery. One or more items shall be included in this sequence.	ALWAYS	AUTO
>>(0022,1053)	1	FL	IOL Power	The intraocular lens power, in diopters. If Type of Optical Correction (0022,1046) is TORIC, this value represents the spherical equivalent of the toric intraocular lens power.	ALWAYS	AUTO
>>(0022,1047)	1C	SQ	Toric IOL Power Sequence	The toric intraocular lens power. Only a single item shall be included in this Sequence. Required if Type of Optical Correction (0022,1046) is TORIC.	ANAP	AUTO
>>>(0046,0146)	3	FD	Sphere Power	The calculated spherical power, in diopters.	ANAP	AUTO
>>>(0046,0147)	1	FD	Cylinder Power	The calculated cylinder power, in diopters.	ALWAYS	AUTO
>>>(0022,0009)	1	FL	Cylinder Axis	The calculated cylinder axis, in degrees.	ALWAYS	AUTO
>>(0022,1054)	1	FL	Predicted Refractive Error	The predicted postoperative refractive error (i.e. amount of near or far sightedness), in diopters.	ALWAYS	AUTO
>>(0022,1054)	1	FL	Predicted Refractive Error	The predicted postoperative refractive error (i.e. amount of near or far sightedness), in diopters.	ALWAYS	AUTO
>>(0022,1048)	1C	SQ	Predicted Toric Error Sequence	The predicted postoperative toric error. Only a single item shall be included in this Sequence. Required if Type of Optical Correction (0022,1046) is TORIC.	ANAP	AUTO
>>>(0046,0146)	3	FD	Sphere Power	The calculated spherical power, in diopters.	ANAP	AUTO
>>>(0046,0147)	1	FD	Cylinder Power	The calculated cylinder power, in diopters.	ALWAYS	AUTO
>>>(0022,0009)	1	FL	Cylinder Axis	The calculated cylinder axis, in degrees.	ALWAYS	AUTO
>>(0022,1097)	2	LO	Implant Part Number	The (product) identifier of the lens.	VNAP	AUTO



>>(0022,1049)	3	CS	Pre-Selected for Implantation	Indicates, whether the intraocular lens specified by this sequence item has been pre-selected for implantation or not. Enumerated Values: YES NO Only one Item in IOL Power Sequence (0022,1090) shall contain the value YES.	ALWAYS	USER
>(0022,1121)	2	FL	IOL Power For Exact Emmetropia	The IOL power that would be required to achieve exact emmetropia, or no need for glasses at distance after surgery, in diopters.	VNAP	AUTO
>(0022,104A)	2C	SQ	Toric IOL Power for Exact Emmetropia Sequence	The toric IOL power that would be required to achieve exact emmetropia. Zero or one Item shall be included in this Sequence. Required if Type of Optical Correction (0022,1046) is TORIC.	ANAP	AUTO
>>(0046,0146)	3	FD	Sphere Power	The calculated spherical power, in diopters.	ANAP	AUTO
>>(0046,0147)	1	FD	Cylinder Power	The calculated cylinder power, in diopters.	ALWAYS	AUTO
>>(0022,0009)	1	FL	Cylinder Axis	The calculated cylinder axis, in degrees.	ALWAYS	AUTO
>(0022,1122)	2	FL	IOL Power For Exact Target Refraction	The IOL power that would be required to exactly achieve the Target Refraction (0022,1037), in diopters.	EMPTY	AUTO
>(0022,104B)	2C	SQ	Toric IOL Power for Exact Target Refraction Sequence	The toric IOL power that would be required to exactly achieve Target Refraction (0022,1037). Zero or one Item shall be included in this Sequence. Required if Type of Optical Correction (0022,1046) is TORIC.	ANAP	AUTO
>>(0046,0146)	3	FD	Sphere Power	The calculated spherical power, in diopters.	ANAP	AUTO
>>(0046,0147)	1	FD	Cylinder Power	The calculated cylinder power, in diopters.	ALWAYS	AUTO
>>(0022,0009)	1	FL	Cylinder Axis	The calculated cylinder axis, in degrees.	ALWAYS	AUTO
>(0022,112A)	3	SQ	Calculation Comment Sequence	Comment, hints or warnings related to the intraocular lens calculation(s). One or more Items are permitted in this Sequence.	ANAP	AUTO
>>(0022,112B)	3	CS	Calculation Comment Type	The type of the Calculation Comment (0022,112C). Defined Terms: INFORMATIVE WARNING	ALWAYS	AUTO
>>(0022,112C)	3	LT	Calculation Comment	Comment related to the intraocular lens calculation(s).	ALWAYS	AUTO



**Table 8-48 Intraocular Lens Calculations IOD - Module "Sop Common"**

Tag	Type	VR	Name	Description	PoV	Source
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. See NEMA PS3.3 C.12.1.1.1 for further explanation. See also PS 3.4.  Always "1.2.840.10008.5.1.4.1.1.78.8"	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. See NEMA PS3.3 C.12.1.1.1 for further explanation. See also PS 3.4.  IOLMaster 700 uses a constant prefix of "1.2.276.0.75.2.1.11.1.3." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See PS3.3 C.12.1.1.2 for Defined Terms.  See 6 Support of Character Sets.	ALWAYS	AUTO, CONFIG
(0008,0012)	3	DA	Instance Creation Date	Date the SOP Instance was created.	ALWAYS	AUTO
(0008,0013)	3	TM	Instance Creation Time	Time the SOP Instance was created.	ALWAYS	AUTO
(0018,A001)	3	SQ	Contributing Equipment Sequence	Sequence of items containing descriptive attributes of related equipment which has contributed to the acquisition, creation or modification of the composite instance. One or more items may be included in this Sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation.  Sequence contains one single item defining the equipment which originally acquired the measurement data.	ALWAYS	AUTO
>(0040,A170)	1	SQ	Purpose of Reference Code Sequence	Describes the purpose for which the related equipment is being reference. Only a single item shall be permitted in this sequence. See NEMA PS3.3 Section C.12.1.1.5 for further explanation.	ALWAYS	AUTO
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1. Always "109101"	ALWAYS	AUTO

>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Always "DCM"		ALWAYS	AUTO
>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3. Always "Acquisition Equipment"		ALWAYS	AUTO
>(0008,0070)	1	LO	Manufacturer	Manufacturer of the equipment that contributed to the composite instance. Always "Carl Zeiss Meditec"		ALWAYS	AUTO
>(0008,0080)	3	LO	Institution Name	Institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Name is defined for contributing equipment.		ANAP	AUTO
>(0008,0081)	3	ST	Institution Address	Address of the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Address is defined for contributing equipment.		ANAP	AUTO
>(0008,1010)	3	SH	Station Name	User defined name identifying the machine that contributed to the composite instance. Attribute does not exist if no Station Name is defined for contributing equipment.		ANAP	AUTO
>(0008,1040)	3	LO	Institutional Department Name	Department in the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institutional Department Name is defined for contributing equipment.		ANAP	AUTO
>(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that contributed to the composite instance. Attribute does not exist if no Manufacturer's Model Name is defined for contributing equipment.		ANAP	AUTO
>(0018,1000)	3	LO	Device Serial Number	Manufacturer's serial number of the equipment that contributed to the composite instance. Attribute does not exist if no Device Serial Number is defined for contributing equipment.		ANAP	AUTO
>(0018,1020)	3	LO	Software Version(s)	Manufacturer's designation of the software version of the equipment that contributed to the composite instance. Attribute does not exist if no Software Version(s) is defined for contributing equipment.		ANAP	AUTO
>(0018,1200)	3	DA	Date of Last Calibration	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Date of Last Calibration is defined for contributing equipment.		ANAP	AUTO

>(0018,1201)	3	TM	Time of Last Calibration	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Time of Last Calibration is defined for contributing equipment.	ANAP	AUTO
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### 8.1.2 Usage of Attributes from Received IOD's

The usage of attributes of Modality Worklist IODs is described in chapter 4.2.1.3.2 Activity - Query Modality Worklist.

### 8.1.3 Attribute Mapping

In scheduled case, the following attributes are mapped from Modality Worklist to any exported Storage SOP Class instance.

**Table 8-49 Modality Worklist Attribute Mapping**

Modality Worklist		Instance IOD		Editable
(0010,0010)	Patient's Name	(0010,0010)	Patient's Name	No
(0010,0020)	Patient ID	(0010,0020)	Patient ID	No
(0010,0021)	Issuer of Patient ID	(0010,0021)	Issuer of Patient ID	No
(0010,1000)	Other Patient IDs	(0010,1000)	Other Patient IDs	No
(0010,0030)	Patient's Birth Date	(0010,0030)	Patient's Birth Date	No
(0010,0040)	Patient's Sex	(0010,0040)	Patient's Sex	No
(0010,2160)	Ethnic Group	(0010,2160)	Ethnic Group	No
(0010,4000)	Patient Comments	(0010,4000)	Patient Comments	No
(0008,0050)	Accession Number	(0008,0050)	Accession Number	No
(0008,0090)	Referring Physicians Name	(0008,0090)	Referring Physicians Name	No
(0040,1001)	Requested Procedure ID	(0020,0010)	Study ID	No
		(0040,0275) >(0040,1001)	Request Attributes Sequence > Requested Procedure ID	No
(0032,1060)	Requested Procedure Description	(0008,1030)	Study Description	No
		(0040,0275) >(0032,1060)	Request Attributes Sequence > Requested Procedure Description	No
(0032,1064)	Requested Procedure Code Sequence	(0008,1032)	Procedure Code Sequence	No
>(0008,0100)	Code Value	>(0008,0100)	Code Value	No
>(0008,0102)	Coding Scheme Designator	>(0008,0102)	Coding Scheme Designator	No
>(0008,0103)	Coding Scheme Version	>(0008,0103)	Coding Scheme Version	No
>(0008,0104)	Code Meaning	>(0008,0104)	Code Meaning	No
(0020,000D)	Study Instance UID	(0020,000D)	Study Instance UID	No
(0008,0020)	Study Date	(0008,0020)	Study Date	No
(0008,0030)	Study Time	(0008,0030)	Study Time	No
(0008,1110)	Referenced Study Sequence	(0008,1110)	Referenced Study Sequence	No

>(0008,1150)	Referenced Sop Class UID	>(0008,1150)	Referenced Sop Class UID	No
>(0008,1155)	Referenced Sop Instance UID	>(0008,1155)	Referenced Sop Instance UID	No
(0040,0100)	Scheduled Procedure Step Sequence			
>(0040,0007)	Scheduled Procedure Step Description	(0040,0275) >(0040,0007)	Request Attributes Sequence > Scheduled Procedure Step Description	No
>(0040,0008)	Scheduled Protocol Code Sequence	(0040,0275) >(0040,0008)	Request Attributes Sequence > Scheduled Protocol Code Sequence	No
>>(0008,0100)	Code Value	>(0008,0100)	Code Value	No
>>(0008,0102)	Coding Scheme Designator	>(0008,0102)	Coding Scheme Designator	No
>>(0008,0103)	Coding Scheme Version	>(0008,0103)	Coding Scheme Version	No
>>(0008,0104)	Code Meaning	>(0008,0104)	Code Meaning	No
>(0040,0009)	Scheduled Procedure Step ID	(0040,0275) >(0040,0009)	Request Attributes Sequence > Scheduled Procedure Step ID	No

### 8.1.4 Coerced/Modified Files

Those tags are listed in chapter 4.2.1.3.2 Activity - Query Modality Worklist. Other attributes get lost and are not available in the IOLMaster 700 Application Software.

## 8.2 Data Dictionary of Private Attributes

The Private Attributes added to created SOP Instances are listed in the Tables below. IOLMaster 700 reserves blocks of private attributes in groups 771b, 1201, 1203, 1205 and 2201.

**Table 8-50 Private Dictionary Group (771b,00xx) = "99CZM"**

Occurs in: Encapsulated PDF SOP Instance

Tag	Attribute Name	VR	VM
(771b,00xx)	Private Creator	LO	1
(771b,xx08)	IOL Laterality	CS	1
(771b,xx09)	Formula Denominator	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,xx2c)	Surgeon	LO	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,xx3b)	White-to-white Values Sequence	SQ	1
(771b,xx43)	Mean Value AL	FD	1
(771b,xx44)	Mean Value SNR	FD	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,xx60)	Haigis-T Sequence	SQ	1

(771b,xx61)	Haigis-T Formula Sequence	SQ	1
(771b,xx62)	Surgical Conditions Sequence	SQ	1
(771b,xx63)	SIA Cylinder	FD	1
(771b,xx64)	SIA Axis	FD	1
(771b,xx65)	Toric IOL Axis	FD	1

**Table 8-51 Private Dictionary Group (1201,00xx) =  
“99CZM\_IOLMaster\_ExtendedKeratometryMeasurements”**

Occurs in: Keratometry Measurements SOP Instance

Tag	Attribute Name	VR	VM
(1201,00xx)	Private Creator	LO	1
(1201,xx01)	IOLMaster Keratometry Quality Right Eye Sequence	SQ	1
(1201,xx02)	IOLMaster Keratometry Quality Left Eye Sequence	SQ	1
(1201,xx03)	Extended Steep Keratometric Axis Sequence	SQ	1
(1201,xx04)	Extended Flat Keratometric Axis Sequence	SQ	1
(1201,xx05)	Standard Deviation of Keratometry Measurement	FD	1
(1201,xx06)	IOLMaster Quality Indicator	CS	1
(1201,xx07)	Standard Deviation of Spherical Equivalent	FD	1
(1201,xx08)	IOLMaster Posterior Cornea Surface Right Eye Sequence	SQ	1
(1201,xx09)	IOLMaster Posterior Cornea Surface Left Eye Sequence	SQ	1
(1201,xx0A)	Steep Posterior Cornea Surface Sequence	SQ	1
(1201,xx0B)	Flat Posterior Cornea Surface Sequence	SQ	1
(1201,xx0C)	Posterior Radius of Curvature	FD	1
(1201,xx0D)	Posterior Keratometric Power	FD	1
(1201,xx0E)	Posterior Keratometric Axis	FD	1
(1201,xx0F)	IOLMaster Total Keratometry Right Eye Sequence	SQ	1
(1201,xx10)	IOLMaster Total Keratometry Left Eye Sequence	SQ	1
(1201,xx11)	Steep Total Keratometry Sequence	SQ	1
(1201,xx12)	Flat Total Keratometry Sequence	SQ	1
(1201,xx13)	Total Keratometry Radius of Curvature	FD	1
(1201,xx14)	Total Keratometry Power	FD	1
(1201,xx15)	Total Keratometry Axis	FD	1
(1201,xx16)	Standard Deviation of Total Keratometry	FD	1
(1201,xx17)	Standard Deviation of Total Keratometry Spherical Equivalent	FD	1
(1201,xx1B)	Index of Refraction of the Cornea	FD	1
(1201,xx1C)	Index of Refraction of the Aqueous Humor	FD	1



(1201,xx1D)	Referenced Keratometry Measurement QC Image Sequence	SQ	1
(1201,xx1E)	Referenced SOP Class UID	UI	1
(1201,xx1F)	Referenced SOP Instance UID	UI	1

**Table 8-52 Private Dictionary Group (1203,00xx) = “99CZM\_IOLMaster\_ClinicalPatientInformation”**

Occurs in: Ophthalmic Axial Measurements and Keratometry Measurements SOP Instance

Tag	Attribute Name	VR	VM
(1203,00xx)	Private Creator	LO	1
(1203,xx01)	IOLMaster Clinical Patient Information Right Eye Sequence	SQ	1
(1203,xx02)	IOLMaster Clinical Patient Information Left Eye Sequence	SQ	1
(1203,xx03)	Refractive State Sequence	SQ	1
(1203,xx04)	Sphere Power	FD	1
(1203,xx05)	Cylinder Power	FD	1
(1203,xx06)	Cylinder Axis	FD	1
(1203,xx07)	Vertex Distance	FD	1
(1203,xx08)	Visual Acuity Sequence	SQ	1
(1203,xx09)	Decimal Visual Acuity	FD	1
(1203,xx0A)	Refractive Surgery State Sequence	SQ	1
(1203,xx0B)	Refractive Procedure Occurred	CS	1
(1203,xx0C)	Refractive Surgery Type Code Sequence	SQ	1
(1203,xx0D)	Code Value	SH	1
(1203,xx0E)	Coding Scheme Designator	SH	1
(1203,xx0F)	Coding Scheme Version	SH	1
(1203,xx10)	Code Meaning	LO	1

**Table 8-53 Private Dictionary Group (1205,00xx) = “99CZM\_IOLMaster\_ExtendedOphthalmicAxialMeasurements”**

Occurs in: Ophthalmic Axial Measurements SOP Instance

Tag	Attribute Name	VR	VM
(1205,00xx)	Private Creator	LO	1
(1205,xx01)	IOLMaster Ophthalmic Axial Measurements Right Eye Sequence	SQ	1
(1205,xx02)	IOLMaster Ophthalmic Axial Measurements Left Eye Sequence	SQ	1

**Table 8-54 Private Dictionary Group (2201,00xx) = “99CZM\_NIM\_INTERNAL\_01”**

Occurs in: Multi-frame Grayscale Byte Secondary Capture Image SOP Instance, Ophthalmic Photography 8 Bit Image SOP Instance, Keratometry Measurements SOP Instance, Ophthalmic Axial Measurements SOP Instance, Intraocular Lens Calculations SOP Instance

Encapsulated PDF Storage

Tag	Attribute Name	VR	VM
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(2201,00xx)	Private Creator	LO	1
(2201,xx00)	IOD Name Meta Info	LT	1
(2201,xx01)	CZM-XML Version	LT	1
(2201,xx02)	Private Module Names and Versions	LT	1

## 8.3 Coded Terminology and Templates

This chapter describes the coded terminology and templates used by the application entity. This includes especially the used codes and DICOM Content Mapping Resource context groups where the codes are taken from.

### 8.3.1 CID 4202. Ophthalmic Photography Acquisition Device

The application software uses (0022,0015) Acquisition Device Type Code Sequence to specify detailed information on the type of acquisition device used for the OP image.

Occurs in: Ophthalmic Photography 8 Bit Image IOD SOP Instance

**Table 8-55 Coded Values - Ophthalmic Photography Acquisition Device**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
OPTICAL_BIOMETRY	99CZM	20160301	Optical Biometry

### 8.3.2 CID 4209. Ophthalmic Anatomic Structure Imaged

The application software uses (0008,2218) Anatomic Region Sequence to specify detailed information on the anatomic region that was examined.

Occurs in: Ophthalmic Photography 8 Bit Image IOD SOP Instance

**Table 8-56 Coded Values - Ophthalmic Anatomic Structure Imaged**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
T-AA000	SRT	n/a	Eye

### 8.3.3 CID 4231. Lens Status

The application software uses (0022,1024) Lens Status Sequence to specify detailed information on lens status of a patient's eye as defined below.

Occurs in: Ophthalmic Axial Measurements SOP Instance

**Table 8-57 Coded Values - Lens Status**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
DA-73410	SRT	n/a	Aphakic
R-2073F	SRT	n/a	Phakic
A-040F7	SRT	n/a	Phakic IOL
F-02087	SRT	n/a	Piggyback IOL
DA-73460	SRT	n/a	Pseudophakia
PGGYBCK_SILICON	99CZM	20160301	Piggyback Silicone IOL
PSDPHKC_SILICON	99CZM	20160301	Pseudophakic Silicone
PSDPHKC_PMMA	99CZM	20160301	Pseudophakic PMMA

### 8.3.4 CID 4232. Vitreous Status

The application software uses (0022,1025) Vitreous Status Code Sequence to specify detailed information on vitreous status of a patient's eye as defined below.

Occurs in: Ophthalmic Axial Measurements SOP Instance

**Table 8-58 Coded Values - Vitreous Status**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
DA-7930D	SRT	n/a	Post-Vitrectomy
F-035FD	SRT	n/a	Silicone Oil
T-AA092	SRT	n/a	Vitreous Only

### 8.3.5 CID 4233. Ophthalmic Axial Length Measurements Segment Names

The application software uses (0022,1101) Ophthalmic Axial Length Measurements Segment Name Code Sequence to specify detailed information on the axial length segment of a patient's eye which has been measured.

Occurs in: Ophthalmic Axial Measurements SOP Instance

**Table 8-59 Coded Values - Ophthalmic Axial Length Measurements Segment Names**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
T-AA200	SRT	n/a	Cornea
T-AA050	SRT	n/a	Anterior Chamber
111778	DCM	n/a	Single or Anterior Lens
IOLM_AQD	99CZM	20160301	Aqueous Depth

### 8.3.6 CID 4234. Refractive Surgery Types

The application software uses (0022,1040)/(1203,xx0B) Refractive Surgery Type Code Sequence to specify detailed information on the type of refractive surgery occurred to a patient's eye.

Occurs in: Ophthalmic Axial Measurements SOP Instance, Keratometry Measurements SOP Instance, Intraocular Lens Calculations SOP Instance

**Table 8-60 Coded Values - Refractive Surgery Types**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
P1-A3102	SRT	n/a	RK
P1-A3835	SRT	n/a	PRK
P0-0526F	SRT	n/a	LASIK
P1-A3846	SRT	n/a	LASEK

### 8.3.7 CID 4235. Keratometry Descriptors

The application software uses (0022,1096) Keratometry Measurement Type Code Sequence to specify detailed information on the type of keratometry measurement performed on a patient's eye.

Occurs in: Intraocular Lens Calculations SOP Instance

**Table 8-61 Coded Values - Keratometry Descriptors**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
111754	DCM	n/a	Auto Keratometry

### 8.3.8 CID 4236. IOL Calculation Formula

The application software uses (0022,1028) IOL Formula Code Sequence to specify detailed information on the IOL calculation formula used to calculate IOL power.

Occurs in: Intraocular Lens Calculations SOP Instance

**Table 8-62 Coded Values - IOL Calculation Formula**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
111760	DCM	n/a	Haigis
111761	DCM	n/a	Haigis-L
111762	DCM	n/a	Holladay 1
111763	DCM	n/a	Holladay 2
111764	DCM	n/a	Hoffer Q
111767	DCM	n/a	SRK-T
111860	DCM	n/a	Haigis Toric
111861	DCM	n/a	Haigis-L Toric
111862	DCM	n/a	Barrett Toric
111863	DCM	n/a	Barrett True-K
111864	DCM	n/a	Barrett True-K Toric
111865	DCM	n/a	Barrett Universal II
IOLM_BRRTT_TKT	99CZM	n/a	Barrett TK Toric
IOLM_BRRTT_TKUUI	99CZM	n/a	Barrett TK Universal II
IOLM_BRRTT_TKTK	99CZM	n/a	Barrett TK True-K
IOLM_BRRTT_TKTKT	99CZM	n/a	Barrett TK True-K Toric

### 8.3.9 CID 4237. Lens Constant Type

The application software uses Lens Constant Sequence (0022,1092) > Concept Name Code Sequence (0040,A043) to specify detailed information on the IOL calculation constant types used to calculate IOL power.

Occurs in: Intraocular Lens Calculations SOP Instance

**Table 8-63 Coded Values - Lens Constant Type**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
F-048FA	SRT	n/a	A-Constant
111768	DCM	n/a	ACD Constant
111769	DCM	n/a	Haigis a0
111770	DCM	n/a	Haigis a1
111771	DCM	n/a	Haigis a2
111772	DCM	n/a	Hoffer pACD Constant
111773	DCM	n/a	Surgeon Factor
111866	DCM	n/a	Barrett Lens Factor
111867	DCM	n/a	Barrett Design Factor

### 8.3.10 CID 4238. Refractive Error Types

The application software uses (0022,1103) Refractive Error Before Refractive Surgery Code Sequence to specify detailed information on the type of refractive error of a patient's eye before refractive surgery was performed.

Occurs in: Intraocular Lens Calculations SOP Instance

**Table 8-64 Coded Values - Refractive Error Types**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
DA-74120	SRT	n/a	Myopia
DA-74110	SRT	n/a	Hyperopia

### 8.3.11 CID 4239. Anterior Chamber Depth Definition

The application software uses (0022,1125) Anterior Chamber Depth Definition Code Sequence to specify detailed information on how to interpret a value for anterior chamber depth.

Occurs in: Ophthalmic Axial Measurements SOP Instance

**Table 8-65 Coded Values - Anterior Chamber Depth Definition**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
111776	DCM	n/a	Front Of Cornea To Front Of Lens

### 8.3.12 CID 4240. Ophthalmic Measurement or Calculation Data Source

The application software uses

- (0022,1035) Source of Ophthalmic Axial Length Code Sequence
- (0022,1132) Source of Lens Thickness Data Code Sequence
- (0022,1133) Source of Anterior Chamber Depth Data Code Sequence
- (0022,1135) Source of Refractive Measurements Code Sequence
- (0022,1150) Ophthalmic Axial Length Data Source Code Sequence

to specify detailed information on the source of the measured value.

Occurs in: Ophthalmic Axial Measurements SOP Instance, Intraocular Lens Calculations SOP Instance

**Table 8-66 Coded Values - Ophthalmic Measurement or Calculation Data Source**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
111780	DCM	n/a	Measurement From This Device
113857	DCM	n/a	Manual Entry
IOLM_SCAN_000	99CZM	20160301	Measurement at scan angle 0°
IOLM_SCAN_030	99CZM	20160301	Measurement at scan angle 30°
IOLM_SCAN_240	99CZM	20160301	Measurement at scan angle 240°
IOLM_SCAN_090	99CZM	20160301	Measurement at scan angle 90°
IOLM_SCAN_300	99CZM	20160301	Measurement at scan angle 300°
IOLM_SCAN_330	99CZM	20160301	Measurement at scan angle 330°
IOLM_COMPOSITE	99CZM	20200428	Calculated composite result

### 8.3.13 CID 4241. Ophthalmic Axial Length Selection Method

The application software uses (0022,1250) Ophthalmic Axial Length Selection Method Code Sequence to specify detailed information on the method used to select the axial length.

Occurs in: Intraocular Lens Calculations SOP Instance

**Table 8-67 Coded Values - Ophthalmic Axial Length Selection Method**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
121412	DCM	n/a	Mean value chosen
121410	DCM	n/a	User chosen value

### 8.3.14 CID 4242. Cornea Measurement Method Descriptors

The application software uses (0046,0116) Cornea Measurement Method Code Sequence to specify detailed information on the method of corneal measurement performed on a patient's eye.

Occurs in: Intraocular Lens Calculations SOP Instance

**Table 8-68 Coded Values - Cornea Measurement Method Descriptors**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
111758	DCM	n/a	Total Cornea Power Measurement Method
111759	DCM	n/a	Posterior Cornea Surface Measurement Method
Include CID 4235 "Keratometry Descriptors"			

### 8.3.15 CID 4243. Ophthalmic Quality Metric Type

The application software uses (0022,1262) Ophthalmic Axial Length Quality Metric Sequence / (0040,A043) Concept Name Code Sequence to specify detailed information on the type of metric used to evaluate the quality of the composite axial length values.

Occurs in: Ophthalmic Axial Measurements SOP Instance

**Table 8-69 Coded Values - Ophthalmic Quality Metric Type**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
111786	DCM	n/a	Standard Deviation of measurements used
IOLM_QUALITY	99CZM	20160301	IOLMaster Quality Metric used Note: 3.0 = Successful 1.75 = Warning 1.0 = Failed 0.0 = None of above

### 8.3.16 CID 7004. Waveform Purposes of Reference

The application software uses (0008,114A) Referenced Instance Sequence to specify references from the OAM quality control image to the related measurements SOP instance and therein the (0040,A170) Purpose of Reference Code Sequence to describe the purpose for which the reference is made.

Occurs in: Multi-frame Grayscale Byte Secondary Capture Image SOP Instance

**Table 8-70 Coded Values - Waveform Purposes of Reference**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
MEASUREMENTS	99CZM	20160301	Measurements SOP Instance associated with this image

### 8.3.17 CID 7005. Contributing Equipment Purposes of Reference

The application software uses (0018,A001) Contributing Equipment Sequence to specify any contributing equipment and therein the (0040,A170) Purpose of Reference Code Sequence to describe the purpose for which the equipment is being referenced.

Occurs in: Multi-frame Grayscale Byte Secondary Capture Image SOP Instance, Ophthalmic Photography 8 Bit Image SOP Instance, Keratometry Measurements SOP Instance, Ophthalmic Axial Measurements SOP Instance, Intraocular Lens Calculations SOP Instance, Encapsulated PDF SOP Instance

**Table 8-71 Coded Values - Contributing Equipment Purposes of Reference**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
109101	DCM	n/a	Acquisition Equipment

### 8.3.18 CID 7201. Referenced Image Purposes of Reference

The application software uses (0008,1140) Referenced Image Sequence to specify reference images related to a certain measurement and therein (0040,A170) Purpose of Reference Code Sequence to describe the purpose for which the reference is made.

Occurs in: Encapsulated PDF SOP Instance

**Table 8-72 Coded Values - Referenced Image Purposes of Reference**

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
SCLERAL_IMG_L	99CZM	20100616	Image of patient's left eye's scleral vessels.
SCLERAL_IMG_R	99CZM	20100616	Image of patient's right eye's scleral vessels.

### 8.3.19 No CID. Acquisition Context Sequence Codes (no context group defined)

The application software uses (0040,0555) Acquisition Context Sequence to specify more detailed information on biometry measurements made in sclera images as defined below.

Occurs in: Ophthalmic Photography 8 Bit SOP Instance (Image Type "ORIGINAL\PRIMARY\SCLERA")

**Table 8-73 Coded Values - Acquisition Context Sequence – Sclera images**

Coding Value	Coding Scheme Designator / Version	Coding Type / Value Multiplcity	Meas. Units Code / Values	Code Meaning / Comments
TORIC_ACQ_Q	99CZM_IOLM / 20100616	Numeric Value VM=1	Range 0.0:1.0	Quality of the image regarding application of markerless IOL.
ACQ_EXP_T	99CZM_IOLM / 20100616	Numeric Value VM=1	millisecond	Exposure time during image acquisition
ACQ_ILLUMN	99CZM_IOLM / 20100616	Numeric Value VM=1	Range 0:255	Brightness of illuminating LEDs during image acquisition Note: Item is not always present.
REFIMG_EVAL_DATA	99CZM / 20160301	Text Value VM=1	n/a	Reference image evaluation data
PixelWidth	99HIKO	Numeric Value VM=1	millimeter	Pixel width in millimeters.



Coding Value	Coding Scheme Designator / Version	Coding Type / Value Multiplicity	Meas. Units Code / Values	Code Meaning / Comments
PixelHeight	99HIKO	Numeric Value VM=1	millimeter	Pixel height in millimeters.
LIMBUSCENTER_X	99CZM / 20160301	Numeric Value VM=1	pixels	X-coordinate of the center of the Limbus Note: Defined in an image coordinate system with its origin [0,0] in upper left corner.
LIMBUSCENTER_Y	99CZM / 20160301	Numeric Value VM=1	pixels	Y-coordinate of the center of the Limbus Note: Defined in an image coordinate system with its origin [0,0] in upper left corner.
LIMBUSRADIUS	99CZM / 20160301	Numeric Value VM=1	millimeter	Radius of the Limbus
LOWERLID_COEFF_A	99CZM / 20160301	Numeric Value VM=1	pixels	Coefficient A of the polynomial for the lower eyelid Note: The polynomial is defined in pixel.
LOWERLID_COEFF_B	99CZM / 20160301	Numeric Value VM=1	pixels	Coefficient B of the polynomial for the lower eyelid Note: The polynomial is defined in pixel.
LOWERLID_COEFF_C	99CZM / 20160301	Numeric Value VM=1	pixels	Coefficient C of the polynomial for the lower eyelid Note: The polynomial is defined in pixel.
UPPERLID_COEFF_A	99CZM / 20160301	Numeric Value VM=1	pixels	Coefficient A of the polynomial for the upper eyelid Note: The polynomial is defined in pixel.
UPPERLID_COEFF_B	99CZM / 20160301	Numeric Value VM=1	pixels	Coefficient B of the polynomial for the upper eyelid Note: The polynomial is defined in pixel.
UPPERLID_COEFF_C	99CZM / 20160301	Numeric Value VM=1	pixels	Coefficient C of the polynomial for the upper eyelid Note: The polynomial is defined in pixel.



Coding Value	Coding Scheme Designator / Version	Coding Type / Value Multiplicity	Meas. Units Code / Values	Code Meaning / Comments
SCLERA_QUALITY	99CZM / 20160301	Text Value VM=1	SUCCESSFUL WARNING FAILED NONE	The IOLMaster quality indicator of sclera measurement

The application software uses (0040,0555) Acquisition Context Sequence to specify more detailed information on biometry measurements made in white-to-white images as defined below.

Occurs in: Ophthalmic Photography 8 Bit SOP Instance (Image Type "ORIGINAL\PRIMARY\WHITE\_TO\_WHITE")

**Table 8-74 Coded Values - Acquisition Context Sequence – White-to-white images**

Coding Value	Coding Scheme Designator	Coding Type / Value Multiplicity	Meas. Units Code / Values	Code Meaning / Comments
WTW_DIAMETER	99CZM	Numeric Value VM=1	millimeter	White-to-white diameter
WTW_FP_X	99CZM	Numeric Value VM=1	millimeter	Horizontal offset of white-to-white center to fixation point
WTW_FP_Y	99CZM	Numeric Value VM=1	millimeter	Vertical offset of white-to-white center to fixation point
PUPIL_DIAMETER	99CZM	Numeric Value VM=1	millimeter	Pupil diameter
PUPIL_FP_X	99CZM	Numeric Value VM=1	millimeter	Horizontal offset of pupil center to fixation point
PUPIL_FP_Y	99CZM	Numeric Value VM=1	millimeter	Vertical offset of pupil center to fixation point
POSITION_FP_X	99CZM	Numeric Value VM=1	pixels	X-coordinate of fixation point in the white-to-white image
POSITION_FP_Y	99CZM	Numeric Value VM=1	pixels	Y-coordinate of fixation point in the white-to-white image
WTW_QUALITY	99CZM	Text Value VM=1	SUCCESSFUL WARNING FAILED NONE	The IOLMaster quality indicator of white-to-white measurement

## 8.4 Greyscale Image Consistency

Not applicable.

## 8.5 Standard Extended / Specialized/ Private SOP Classes

The following standard extensions are used in the IODs described in chapter 8.1.1 Created SOP Instance(s):

- Table 8-15 Encapsulated PDF IOD - Module "CZM Encapsulated Pdf Instance Extension"
- Table 8-16 Encapsulated PDF IOD - Module "CZM IOL Measured Values"

- Table 8-17 Encapsulated PDF IOD - Module "CZM IOL Haigis-T"
- Table 8-52 Multi Frame Grayscale Byte Sc Image IOD - Module "Czm Multi Frame Grayscale Byte Sc Image Extension"
- Table 8-56 Ophthalmic Axial Measurements IOD - Module "CZM IOLM Clinical Patient Information"
- Table 8-60 Keratometry Measurements IOD - Module "CZM IOLM Keratometry Quality"
- Table 8-61 Keratometry Measurements IOD - Module "CZM IOLM Posterior Cornea Surface Measurements"
- Table 8-62 Keratometry Measurements IOD - Module "CZM IOLM Total Keratometry Measurements"
- Table 8-63 Keratometry Measurements IOD - Module "CZM IOLM Clinical Patient Information"

## 8.6 Private Transfer Syntaxes

No Private Transfer Syntax is supported.



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