DICOM Conformance Statement

VISUSCREEN 100/500

Version 2.4

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1 Conformance Statement Overview

The VISUSCREEN is a subjective refraction acquisition modality device. These acquisition modalities enable the examination of the patient's eyes.

VISUSCREEN implements one single DICOM Application Entity which allows to:

- query modality worklist
- query patients
- archive measurement data (SRF, AR, KER, LEN)
- retrieve measurement data (SRF, AR, LEN)

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

Table 1-1 Network Services Supported

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Subjective Refraction Measurements Storage	Yes	Yes
Autorefraction Measurements Storage	Yes	Yes
Keratometry Measurements Storage	Yes	Yes
Lensometry Measurements Storage	Yes	Yes
Workflow Management		
Storage Commitment Push Model SOP Class	Yes	No
Modality Worklist Information Model - FIND	Yes	No
Query / Retrieve		
Patient Root Query/Retrieve Information Model – FIND	Yes	No
Study Root Query/Retrieve Information Model – FIND	Yes	No
Study Root Query/Retrieve Information Model – MOVE	Yes	No

The VISUSCREEN does not support Media Interchange.

2 Table of Contents

3 Introduction

3.1 Revision History

Document Version	Date	Author	Changes
1.0	2015-09-17	Peter J. Haas	Initial revision
1.1	2015-10-01	M. Hebebrand	Update DCS
1.2	2015-10-07	M. Hebebrand	Update DCS after Review
1.3	2015-10-20	M. Hebebrand	Update DCS after Review

3.2 Audience

This document is written for the people that need to understand how VISUSCREEN 100/500 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 VISUSCREEN 100/500 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.

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.

PACS
: Picture Archive and Commucnication System

PMS
: Patient Management System.

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

Query Key
: A 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.

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3.5 Abbreviations

Table 3-1 Abbreviations used in this document

Abbreviation	Definition
AE	Application Entity
AET	Application Entity Title
ANAP	Attribute is not always present - applicable for type 3 attributes
APP	Application
AR	Autorefraction
AUTO	Automatically generated, cannot be modified by the operator
BRQ	Broad Query mode of Modality Worklist Query
CCH	Cache
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

Abbreviation	Definition
KER	Keratometry
LEN	Lensometry
MWL	Modality Worklist
OD	Oculus Dexter, the right eye
OS	Oculus Sinister, the left eye
OU	Oculus Uterque, both eyes
PL	Pick list
PLD	Pick list item details
QR	Query
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.
SRF	Subjective Refraction
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 and 2C attributes

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/)

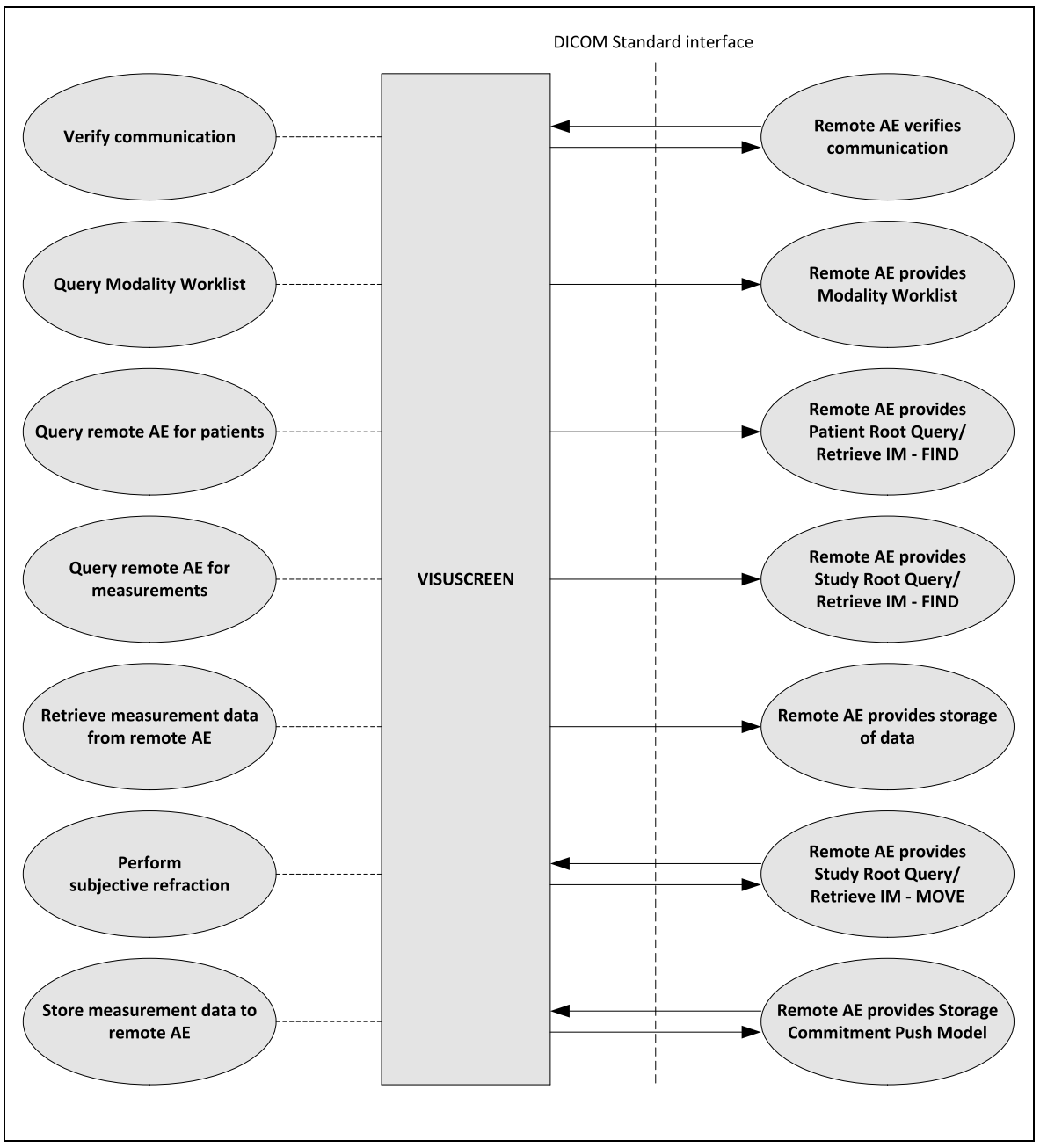
Integrating the Healthcare Enterprise (IHE) EYECARE Technical Framework, rev 3.7, 2010 (available free at http://www.ihe.net/Technical_Framework/index.cfm

4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow

Figure 4-1 VISUSCREEN Application Software as Acquisition Modality



4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of VISUSCREEN

The VISUSCREEN is a subjective refraction acquisition modality device. These acquisition modalities enable the examination of the patient's eyes.

The VISUSCREEN application Software allows to:

- query modality worklist
- query patients
- archive measurement data (SRF, AR, KER, LEN)
- retrieve measurement data (SRF, AR, LEN)

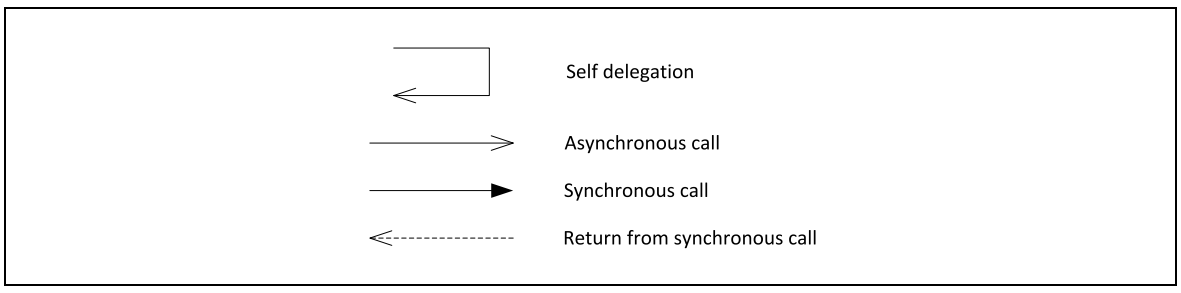
The VISUSCREEN Software allows performing a verification of the configured AE. The result of this verification contains information about the supported SOP Classes and Transfer Syntaxes.

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

The VISUSCREEN 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 Acquisition Modality activities

Query Modality Worklist

When the patient arrives at the VISUSCREEN, the operator queries the worklist. The user can invoke this by simply drag down the first item in the patient list in the patient screen. The patient list lists all patients scheduled for today for the modality "Subjective Refraction" (SRF) .

In either way the operator can select a patient from the result list

The VISUSCREEN can't handle multiple Scheduled Procedure Steps in one Scheduled Procedure.

Query remote AE for patients

When the patient arrives at the VISUSCREEN, the operator can search patients stored at a remote AE. This can be done by using the "Search field" in the "Patient" screen. Any matching results will be listed in patient list. Only data supported by VISUSCREEN will be listed.

This activity generates an unscheduled case.

The operator can then select the patient.

Query remote AE for measurements

When a patient or worklist item is selected VISUSCREEN automatic trigger an query of patient measurements from the modalities “Subjective Refraction” (SRF) “Autorefraction” (AR) and “Lensometry” (LEN).

Retrieve measurement data from remote AE

When a measurement list item is selected VISUSCREEN automatic trigger an retrieve of patient measurement data. This can be used as initial data to perform the subjective refraction measurement (“Patient” screen) or to compare with the result of the subjective refraction (“Result” screen).

Perform subjective refraction

When a patient or worklist item is selected the operator can start the subjective refraction process by touching the “Start” button. The Application Software allows the user to review the acquired measurement data before permanently saving the measurement result (“Result” screen).

This activity creates measurement data.

Store measurement data to remote AE

This activity is triggered by the “Save Results” button in the “Result” screen. During this activity acquired measurement data are transferred to the configured Storage Provider.

After the storage, the Application Software asks the configured Storage Commitment Provider to take over responsibility on data persistence for the data previously transferred.

4.1.3.2 Common sequences

Figure 4-2 “Refraction” and “Result” screen

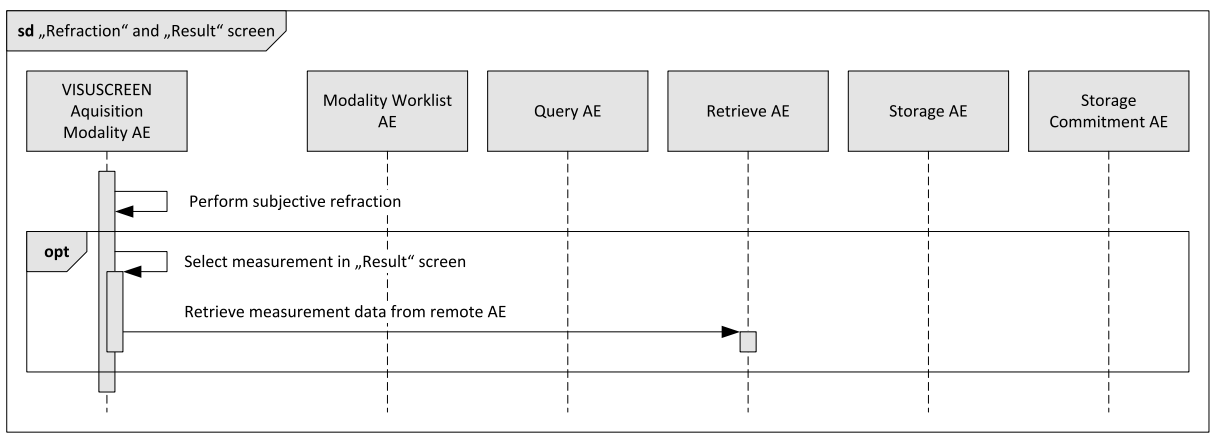
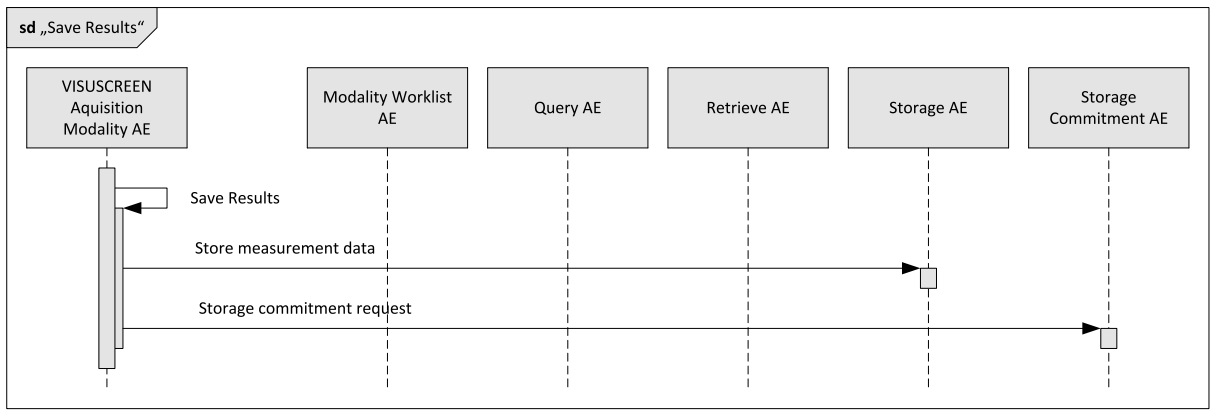


Figure 4-3 “Save Results”



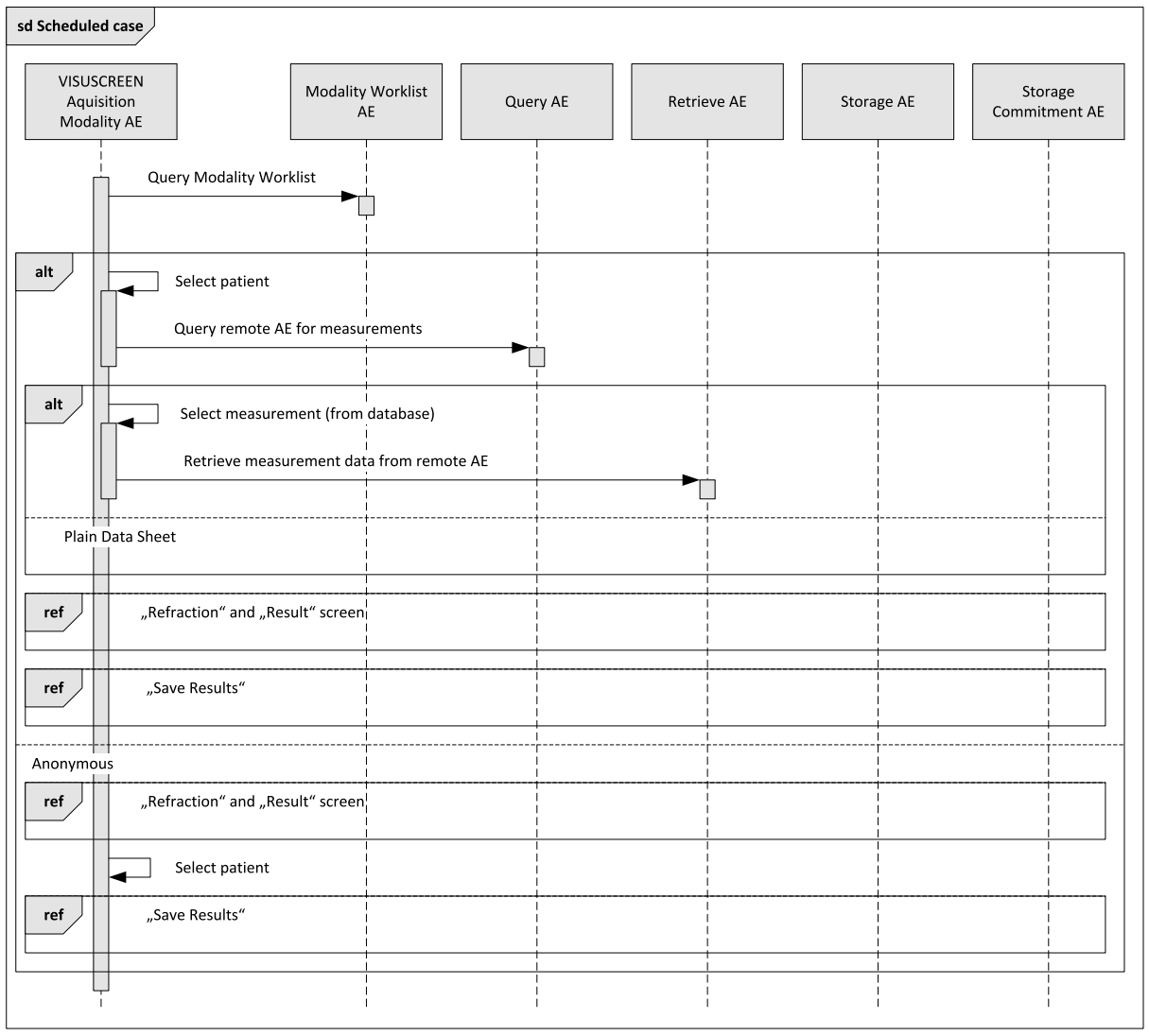
4.1.3.3 Scheduled case with Acquisition Modality

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 VISUSCREEN these patients appear in the patient list in the main screen. This information is used to take the examination.

Figure 4-4 Scheduled Case

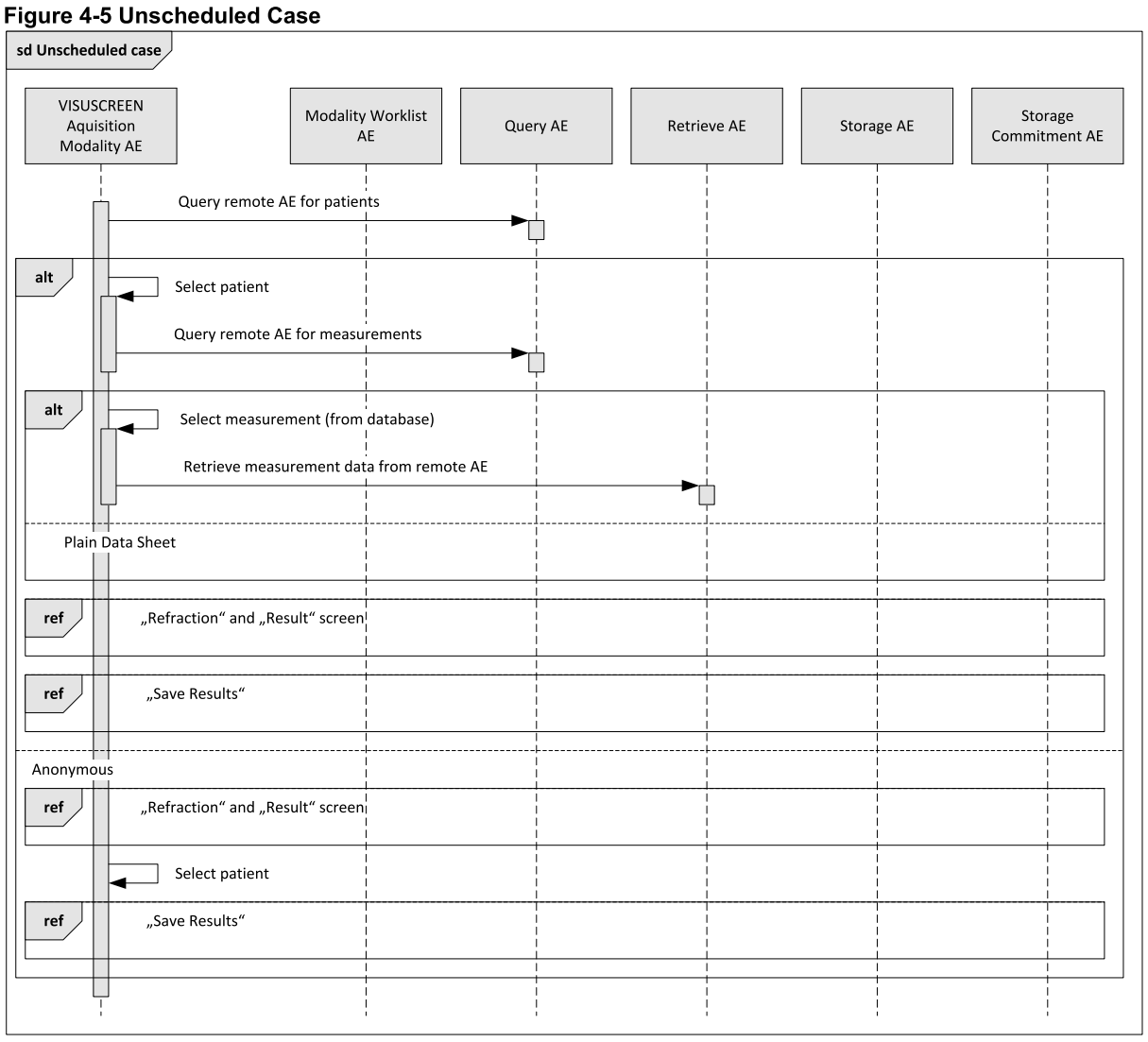


4.1.3.4 Unscheduled case

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 4-5 Unscheduled Case



4.2 AE Specifications

4.2.1 VISUSCREEN AE Specification

4.2.1.1 SOP Classes

Table 4-1 SOP Classes for VISUSCREEN 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
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	Yes	Yes
Autorefraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	Yes	Yes
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	Yes	Yes
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	Yes	Yes

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No

Note 1: More SOP Classes are negotiated by application then are used.

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
- 1 association for Query/Retrieve - MOVE
- 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

VISUSCREEN 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-2.8

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 device startup phase. It facilitates the setup and management of the DICOM Application Entities.

In the association request VISUSCREEN 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.

If the “Verify Communication” activity fails, no database connection will be established on the VISUSCREEN application.

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 Presentation Contexts proposed by the VISUSCREEN AE

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	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Lensometry Measurements Storage	5.1.4.1.1.78.1	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Autorefraction Measurements Storage	5.1.4.1.1.78.2	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Subjective Refraction Measurements Storage	5.1.4.1.1.78.4	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Raw Data Storage[3]	5.1.4.1.1.66	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	No

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

Note 2: Only acts as SCP when a C-MOVE-RQ was initiated first and this association is still open.

Note 3: More SOP Classes are negotiated by application then are used.

4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The VISUSCREEN Application Software provides standard conformance.

4.2.1.3.2 Activity – Query Modality Worklist

4.2.1.3.2.1 Description and Sequencing of Activities

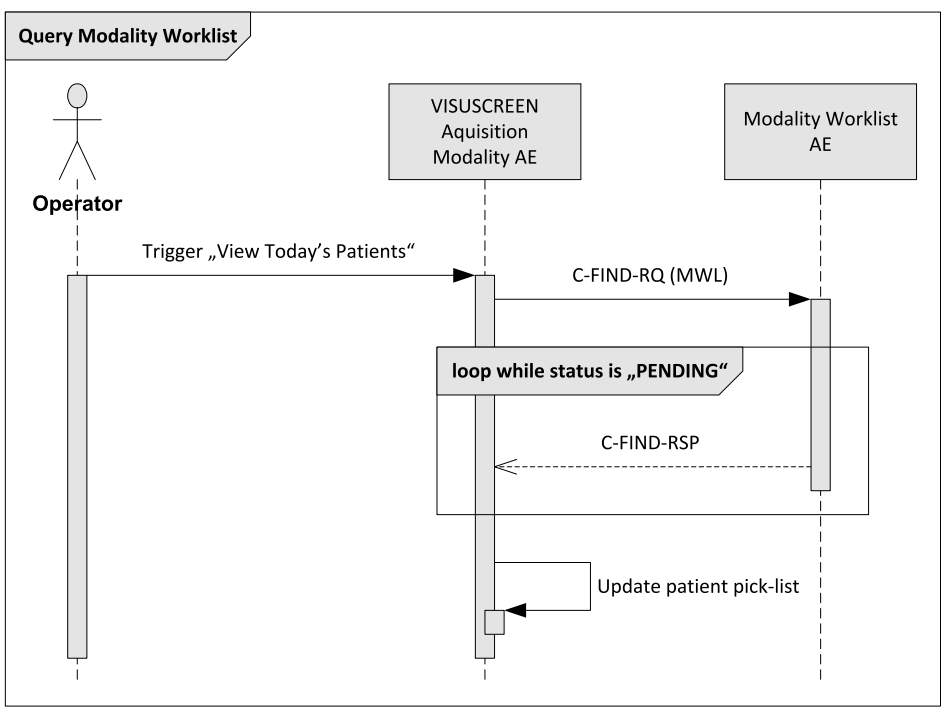
The Application Software performs a query with predefined query keys. The operator cannot change the query key values. The applied query keys are:

Table 4-6 Modality Worklist Query for Today's Patients

Tag	Attribute Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	
>(0008,0060)	Modality	Uses the modality as configured for the VISUSCREEN instrument.
>(0040,0002)	Scheduled procedure Step Start Date	Uses the date of today.

All matching worklist items are subject to be imported into the local database.

Figure 4-6 Interactive Query



Trigger “View Today’s Patients”

The activity “Query Modality Worklist” can be triggered by operator if the search text field is empty by simply drag down the first item in the patient list in the patient screen. It is meaningful to perform the query when the patient arrives at the modality. Then the patient list contains the latest information.

A second way to trigger this activity is pressing the “Enter” key in combination with an empty search text field.

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 4-7 Proposed Presentation Contexts by the VISUSCREEN AE

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	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Lensometry Measurements Storage	5.1.4.1.1.78.1	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Autorefraction Measurements Storage	5.1.4.1.1.78.2	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Subjective Refraction Measurements Storage	5.1.4.1.1.78.4	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Raw Data Storage[3]	5.1.4.1.1.66	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	No

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

Note 2: Only acts as SCP when a C-MOVE-RQ was initiated first and this association is still open.

Note 3: More SOP Classes are negotiated by application then are used.

4.2.1.3.2.3 SOP Specific Conformance for Modality Worklist SOP Class

Table 4-8 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	0122	Log message and display user alert message.

Service Status	Further Meaning	Error Code	Behavior
	class not supported		
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 4-9 Attributes involved in Modality Worklist C-FIND request and response

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
Scheduled Procedure Step (SPS)						
(0040,0100)	Scheduled Procedure Step Sequence					
>(0040,0001)	Scheduled Station Application Entity Title		X			X
>(0040,0003)	Scheduled Procedure Step Start Time		X	PL		X
>(0040,0002)	Scheduled Procedure Step Start Date	BRQ	X	PL		X
>(0008,0060)	Modality	BRQ	X			X
>(0040,0006)	Scheduled Performing Physicians Name					
>(0040,0007)	Scheduled Procedure Step Description		X			X
>(0040,0010)	Scheduled Station Name					
>(0040,0011)	Scheduled Procedure Step Location					
>(0040,0008)	Scheduled Protocol Code Sequence		X			X
>>(0008,0100)	Code Value		X			X
>>(0008,0102)	Coding Scheme Designator		X			X
>>(0008,0103)	Coding Scheme Version		X			X
>>(0008,0104)	Code Meaning		X			X
>(0040,0012)	Pre-Medication					
>(0040,0009)	Scheduled Procedure Step ID		X			X
>(0032,1070)	Requested Contrast Agent					
Requested Procedure						
(0040,1001)	Requested Procedure ID		X			X
(0032,1060)	Requested Procedure Description		X			X
(0032,1064)	Requested Procedure Code Sequence		X			X
>(0008,0100)	Code Value		X			X
>(0008,0102)	Coding Scheme Designator		X			X
>(0008,0103)	Coding Scheme Version		X			X
>(0008,0104)	Code Meaning		X			X
(0020,000D)	Study Instance UID		X			X
(0008,1110)	Referenced Study Sequence		X			X
>(0008,1150)	Referenced SOP Class UID		X			X
>(0008,1155)	Referenced SOP Instance UID		X			X
(0040,1003)	Requested Procedure Priority					
(0040,1004)	Patient Transport Arrangements					
(0040,1400)	Requested Procedure Comments		X			X
Imaging Service Request						
(0008,0050)	Accession Number		X			X

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0032,1032)	Requesting Physician		X			X
(0008,0090)	Referring Physicians Name		X			X
Visit Identification						
(0038,0010)	Admission ID					
Visit Status						
(0038,0300)	Current Patient Location					
Visit Relationship						
(0008,1120)	Referenced Patient Sequence					
>(0008,1150)	Referenced SOP Class UID					
>(0008,1155)	Referenced SOP Instance UID					
Patient Identification						
(0010,0010)	Patients Name[1]		X	PL, PLD		X
(0010,0020)	Patients ID		X	PL, PLD		X
(0010,0021)	Issuer of Patient ID		X			X
(0010,1000)	Other Patient IDs		X			X
Patient Demographic						
(0010,0030)	Patients Birth Date		X	PLD		X
(0010,0040)	Patients Sex		X	PLD		X
(0010,1030)	Patients Weight					
(0040,3001)	Confidentiality Constraint on Patient Data Description					
(0010,4000)	Patients Comments		X	APP		X
Patient Medical						
(0038,0500)	Patient State					
(0010,21C0)	Pregnancy Status					
(0010,2000)	Medical Alerts					
(0038,0050)	Special Needs					

Note 1: 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. The priority order is: ideographic, phonetic, alphabetic.

Values of column “Query Key”:

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.

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. These values are used for Storage.

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 4-10 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 value is today’s date.
>(0008,0060)	Modality	The value is “SRF”.

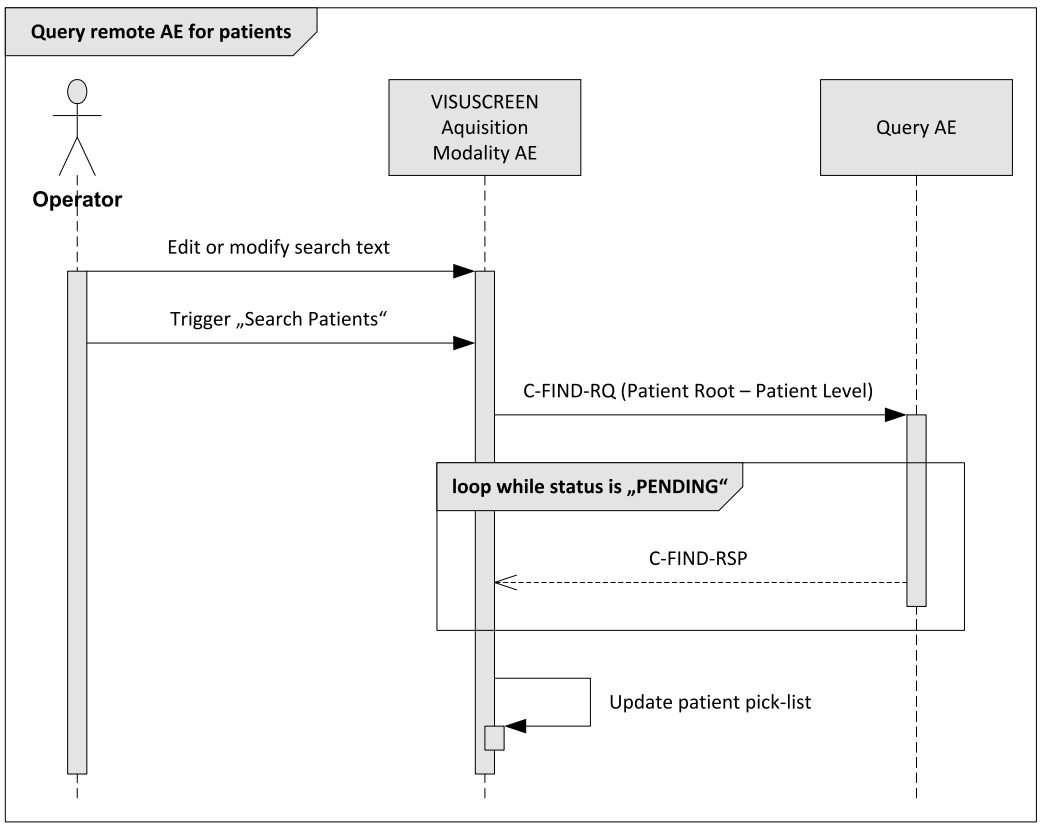
4.2.1.3.3 Activity – Query remote AE for patients

Query is used to get patient information and meta data of instances on a DICOM server.

4.2.1.3.3.1 Description and Sequencing of Activities

In the patient screen the user can trigger a search in “Patient Family Name” and/or in “Patient Given Name” in parallel or in “Patient ID”.

Figure 4-7 Query for patients



Edit or modify search text

There is only one edit field to enter the search text.

The syntax of the search text is “[<Patient Family Name>][,<Patient Given Name>]” for name search and “#id” for Patient ID search. The search is case insensitive and has automaticalle a trailing wildcard (*) to fulfil the ‘starts with’ condition.

- (0010,0010) Patient’s Name – Family Name
- (0010,0020) Patient’s Name – Given Name
- (0010,0020) Patient ID

For more details on supported query keys see Table 4-14 Query key details.

Trigger “Search Patients”

The operator triggers the search after he or she filled in search criteria by pressing the “Enter” key. 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 accepts up to a configurable number of matches. After receiving the response, the patient pick-list is updated. The patient pick-list provides the most important information for a quick overview.

An empty search text trigger the Modality Worklist (see “Query Modality Worklist”)

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.

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

Table 4-11 Proposed Presentation Contexts by the VISUSCREEN AE

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	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Lensometry Measurements Storage	5.1.4.1.1.78.1	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Autorefraction Measurements Storage	5.1.4.1.1.78.2	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Subjective Refraction Measurements Storage	5.1.4.1.1.78.4	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Raw Data Storage[3]	5.1.4.1.1.66	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	No

Note 1: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.
Note 2: Only acts as SCP when a C-MOVE-RQ was initiated first and this association is still open.
Note 3: More SOP Classes are negotiated by application then are used.

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

Table 4-12 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 4-13 PATIENT level keys for the Patient Root Query/Retrieve Information Model (request and response)

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0010,0010)	Patient's Name[1]	X	X	X		
(0010,0020)	Patient ID	X	X	X		
(0010,0021)	Issuer of Patient ID		X			
(0010,0030)	Patient's Birth Date		X	X		
(0010,0032)	Patient's Birth Time					

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0010,0040)	Patient's Sex		X	X		
(0010,1000)	Other Patient IDs					
(0010,2160)	Ethnic Group					
(0010,4000)	Patient Comments		X	X		

[1] Note: 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. The priority order is: ideographic, phonetic, alphabetic. The name what have been entered as query key will be always sent in the Alphabetic group of the C-Find-RQ.

Values of column "Query Key":

X

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

AUTO

The value cannot be modified by the operator.

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 "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 "mapping of attributes" in 8.1.3 Attribute Mapping.

Table 4-14 Query key details

Tag	Tag Name	Description
(0010,0010)	Patient's Name[1]	The default value is empty string. Only family name and given name can be used as query keys. The search use always a trailing '*' as wild card. This is a DICOM Standard query key on Patient level.

Tag	Tag Name	Description
(0010,0020)	Patient ID	The operator can enter each value that conforms to the Value Representation LO. This is a DICOM Standard query key on Patient level.

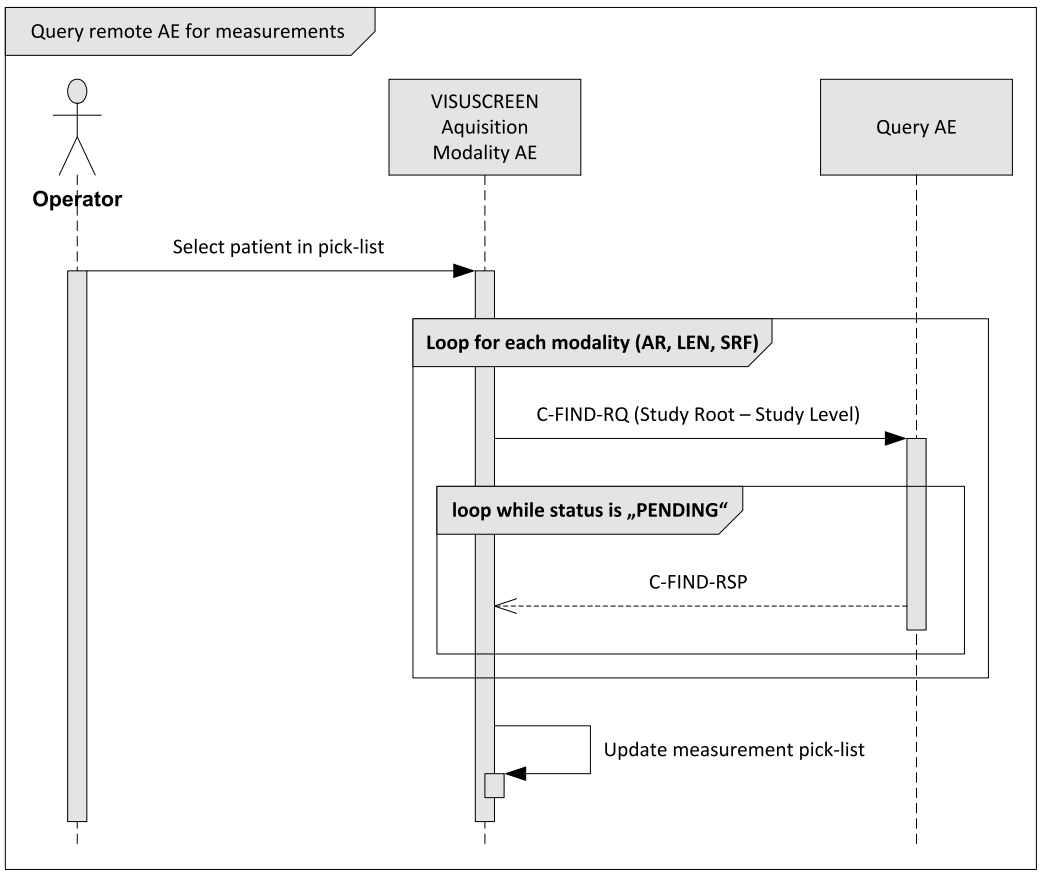
Note 1: The name what have been entered as query key will be always sent in the Alphabetic group of the C-Find-RQ.

4.2.1.3.4 Activity – Query remote AE for measurements

4.2.1.3.4.1 Description and Sequencing of Activities

If the operator selects a patient in the patient screen, the measurement query is triggered.

Figure 4-8 Query remote AE for measurements



Select patient in pick-list

If the operator selects a patient, the VISUSCREEN queries for measurement with the modalities “Subjective Refraction” (SRF) “Autorefraction” (AR) and “Lensometry” (LEN).

4.2.1.3.4.2 Proposed Presentation Contexts

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

- "Study 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 4-15 Proposed Presentation Contexts by the VISUSCREEN AE

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	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Lensometry Measurements Storage	5.1.4.1.1.78.1	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Autorefraction Measurements Storage	5.1.4.1.1.78.2	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Subjective Refraction Measurements Storage	5.1.4.1.1.78.4	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Raw Data Storage[3]	5.1.4.1.1.66	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	No

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

Note 2: Only acts as SCP when a C-MOVE-RQ was initiated first and this association is still open.

Note 3: More SOP Classes are negotiated by application then are used.

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

Table 4-16 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 4-17 STUDY level keys for the Study Root Query/Retrieve Information Model (request and response)

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0008,0005)	Specific Character Set	AUTO				
(0008,0052)	Query/Retrieve Level	AUTO				
(0010,0010)	Patient’s Name	AUTO				
(0010,0020)	Patient ID	AUTO				
(0010,0021)	Issuer of Patient ID	AUTO				

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0010,0030)	Patient’s Birth Date	AUTO				
(0010,0040)	Patient’s Sex	AUTO				
(0010,1000)	Other Patient IDs					
(0010,2160)	Ethnic Group					
(0010,4000)	Patient Comments	AUTO				
(0008,0020)	Study Date		X	X		
(0008,0030)	Study Time		X	X		
(0008,0050)	Accession Number					
(0008,0061)	Modalities in Study	AUTO		X		
(0008,0090)	Referring Physician’s Name					
(0008,1030)	Study Description		X			
(0008,1080)	Admitting Diagnoses Description					
(0020,0010)	Study ID					
(0020,000D)	Study Instance UID		X			

Values of column “Query Key”:

X

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

AUTO

The value cannot be modified by the operator.

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 “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 “mapping of attributes” in 8.1.3 Attribute Mapping.

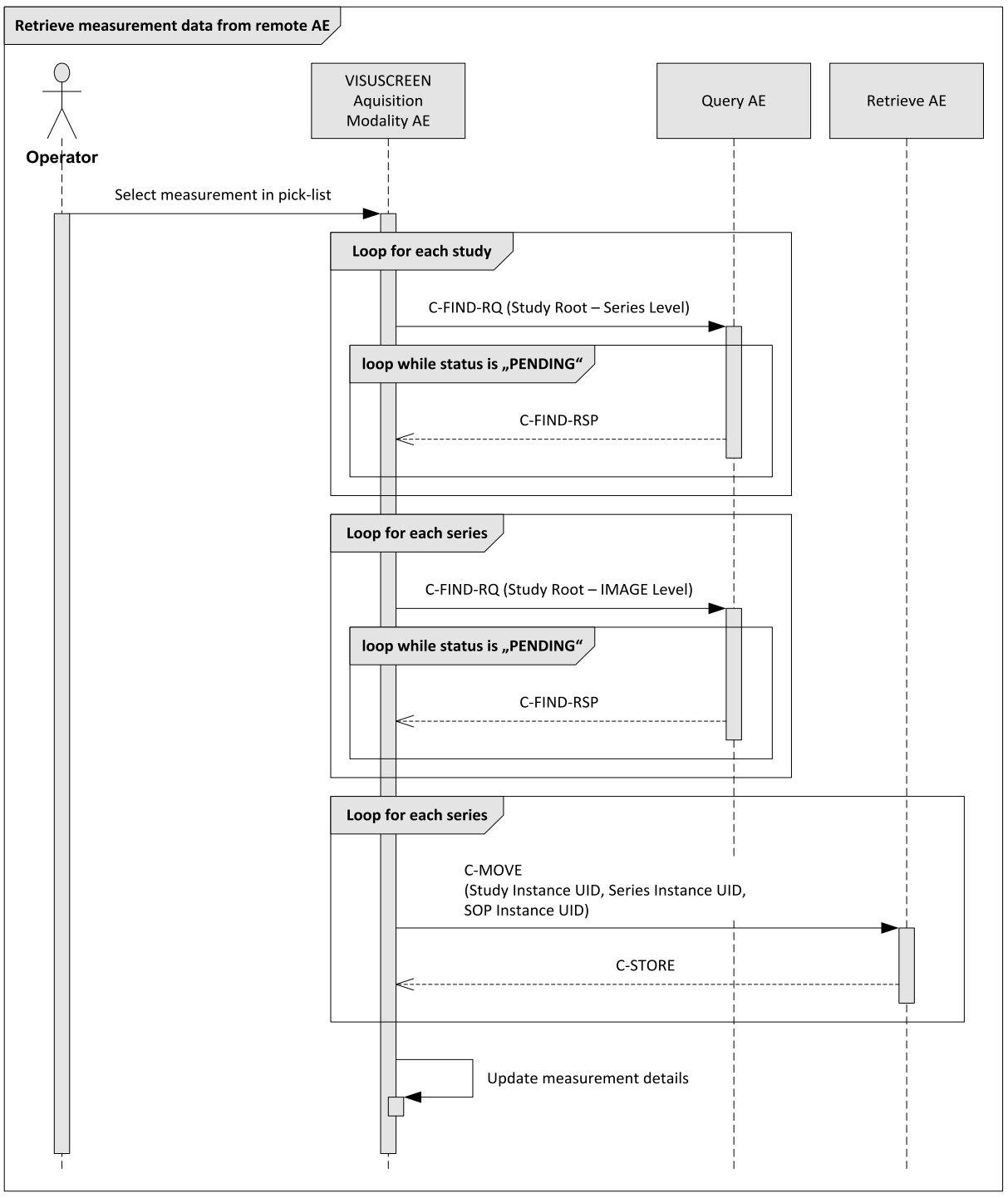
Table 4-18 Query key details

Tag	Tag Name	Description
(0010,0020)	Patient ID	This attribute is used as query key automatically when the operator selects a patient from the patient list and the application starts querying the remote AE for “Visits” and “Exams”. The value assigned conforms to the value gathered from the previous Patient root Query. The value conforms to the Value Representation LO. This is a DICOM Standard query key on Patient level.
(0010,0021)	Issuer of Patient ID	This attribute is used as query key automatically when the operator selects a patient from the patient list and the application starts querying the remote AE for “Visits” and “Exams”. The value assigned conforms to the value gathered from the previous Patient root Query. 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.
(0008,0060)	Modality	The VISUSCREEN Application Software use “AR” (Autorefraction), “LEN” (Lensometry) and “SRF” (Subjective Refraction) in 3 successive queries. This is a DICOM Standard query key on Series level.

4.2.1.3.5 Activity – Retrieve measurement data from remote AE

4.2.1.3.5.1 Description and Sequencing of Activities

Figure 4-9 Retrieve measurement data from remote AE



Select measurement in pick-list

If the operator selects a measurement, the VISUSCREEN query for the measurement data.

4.2.1.3.5.2 Proposed Presentation Contexts

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

- Study Root Q/R IM - FIND" with Transfer Syntax ILE
- Study Root Q/R IM - MOVE" with Transfer Syntax ILE

Table 4-19 Proposed Presentation Contexts by the VISUSCREEN AE

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	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Lensometry Measurements Storage	5.1.4.1.1.78.1	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Autorefraction Measurements Storage	5.1.4.1.1.78.2	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Subjective Refraction Measurements Storage	5.1.4.1.1.78.4	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Raw Data Storage[3]	5.1.4.1.1.66	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	No

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

Note 2: Only acts as SCP when a C-MOVE-RQ was initiated first and this association is still open.

Note 3: More SOP Classes are negotiated by application then are used.

4.2.1.3.5.3 SOP Specific Conformance for Study Root Query/Retrieve SOP Class as SCU

Table 4-20 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.

Service Status	Further Meaning	Error Code	Behavior
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 4-21 Retrieve C-MOVE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Failure	Refused: Out of Resources – Unable to calculate number of matches	A701	Log message and retry. If error persists display user alert
Failure	Refused: Out of Resources – Unable to perform sub-operations	A702	Log message and retry. If error persists display user alert
Failure	Refused: Move Destination unknown	A801	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	Sub-operations terminated due to Cancel Indication	FE00	Log message and display user alert

Service Status	Further Meaning	Error Code	Behavior
Warning	Sub-operations Complete – One or more Failures	B000	Log message and display user alert
Success	Matching is complete – No final Identifier is supplied	0000	The Application Software returns from this activity.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Log message.
Unknown	All other responses with unknown code meaning	xxxx	Log message and display user alert

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

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0008,0005)	Specific Character Set	AUTO				
(0008,0052)	Query/Retrieve Level	AUTO				
(0010,0010)	Patient's Name					
(0010,0020)	Patient ID					
(0010,0021)	Issuer of Patient ID					
(0010,0030)	Patient's Birth Date					
(0010,0040)	Patient's Sex					
(0010,1000)	Other Patient IDs					
(0010,2160)	Ethnic Group					
(0010,4000)	Patient Comments					
(0008,0020)	Study Date					
(0008,0030)	Study Time					
(0008,0050)	Accession Number					
(0008,0061)	Modalities in Study					
(0008,0090)	Referring Physician's Name					
(0008,1080)	Admitting Diagnoses Description					
(0020,0010)	Study ID					

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0020,000D)	Study Instance UID	AUTO				
(0008,1030)	Study Description					
(0008,0021)	Series Date					
(0008,0031)	Series Time					
(0008,0060)	Modality					
(0020,0011)	Series Number					
(0020, 000E)	Series Instance UID		X			
(0008, 103E)	Series Description					
(0008,1050)	Performing Physician's Name					
(0008,1090)	Manufacturer’s Model Name					
(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 IMAGE level keys for the Study Root Query/Retrieve Information Model (request and response)

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0008,0005)	Specific Character Set	AUTO				
(0008,0052)	Query/Retrieve Level	AUTO				
(0010,0010)	Patient’s Name					
(0010,0020)	Patient ID					
(0010,0021)	Issuer of Patient ID					
(0010,0030)	Patient’s Birth Date					
(0010,0032)	Patient’s Birth Time					
(0010,0040)	Patient’s Sex					
(0010,1000)	Other Patient IDs					
(0010,2160)	Ethnic Group					
(0010,4000)	Patient Comments					
(0008,0020)	Study Date					

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0008,0030)	Study Time					
(0008,0050)	Accession Number					
(0008,0061)	Modalities in Study					
(0008,0090)	Referring Physician’s Name					
(0008,1080)	Admitting Diagnoses Description					
(0020,0010)	Study ID					
(0020,000D)	Study Instance UID	AUTO				
(0008,1030)	Study Description					
(0008,0021)	Series Date					
(0008,0031)	Series Time					
(0008,0060)	Modality					
(0020,0011)	Series Number					
(0020, 000E)	Series Instance UID	AUTO				
(0008, 103E)	Series Description					
(0008,1050)	Performing Physician's Name					
(0008,1090)	Manufacturer’s Model Name					
(0020,0060)	Laterality					
(0040,0244)	Performed Procedure Step Start Date					
(0040,0245)	Performed Procedure Step Start Time					
(0040,0275)	Request Attributes Sequence					
(0008,0018)	SOP Instance UID		X			
(0008,0016)	SOP Class UID					
(0020,0013)	Instance Number					
(0008,0008)	Image Type					
(0008,0012)	Instance Creation Date					
(0008,0013)	Instance Creation Time					
(0008,002A)	Acquisition DateTime					
(0008,114A)	Referenced Instance Sequence					
(0020,0062)	Image Laterality					
(0008,9123)	Creator-Version UID					
(0042,0010)	Document Title					

Table 4-24 Keys for the C-MOVE request

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
(0008,0005)	Specific Character Set	AUTO				
(0008,0052)	Query/Retrieve Level	AUTO				
(0020,000D)	Study Instance UID	AUTO				
(0020,000E)	Series Instance UID	AUTO				
(0008,0018)	SOP Instance UID	AUTO				

Values of column “Query Key”:

X

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

AUTO

The value cannot be modified by the operator.

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 “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 “mapping of attributes” in 8.1.3 Attribute Mapping.

Table 4-25 Query key details

Tag	Tag Name	Description
(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.

Tag	Tag Name	Description
(0010,0021)	Issuer of patient ID	This attribute is used as query key automatically when the operator selects a patient from the patient list and the application starts querying the remote AE for “Visits” and “Exams”. The value assigned conforms to the value gathered from the previous Patient root Query. 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.
(0008,0060)	Modalities in Study	The default value is empty string. 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. This is a DICOM Standard query key on Series level.
(0020,000D)	Study Instance UID	The Measurement ID
(0020,000E)	Series Instance UID	The Series Instance ID is not visible in the User Interface, it is only used for iteration to the desired measurement data
(0008,0018)	SOP Instance UID	The SOP Instance ID is not visible in the User Interface, it is only used for iteration to the desired measurement data

4.2.1.3.6 Activity – Perform subjective refraction

Operator can trigger “Perform subjective refraction” at any time by touch the “Start” button in the patient screen.

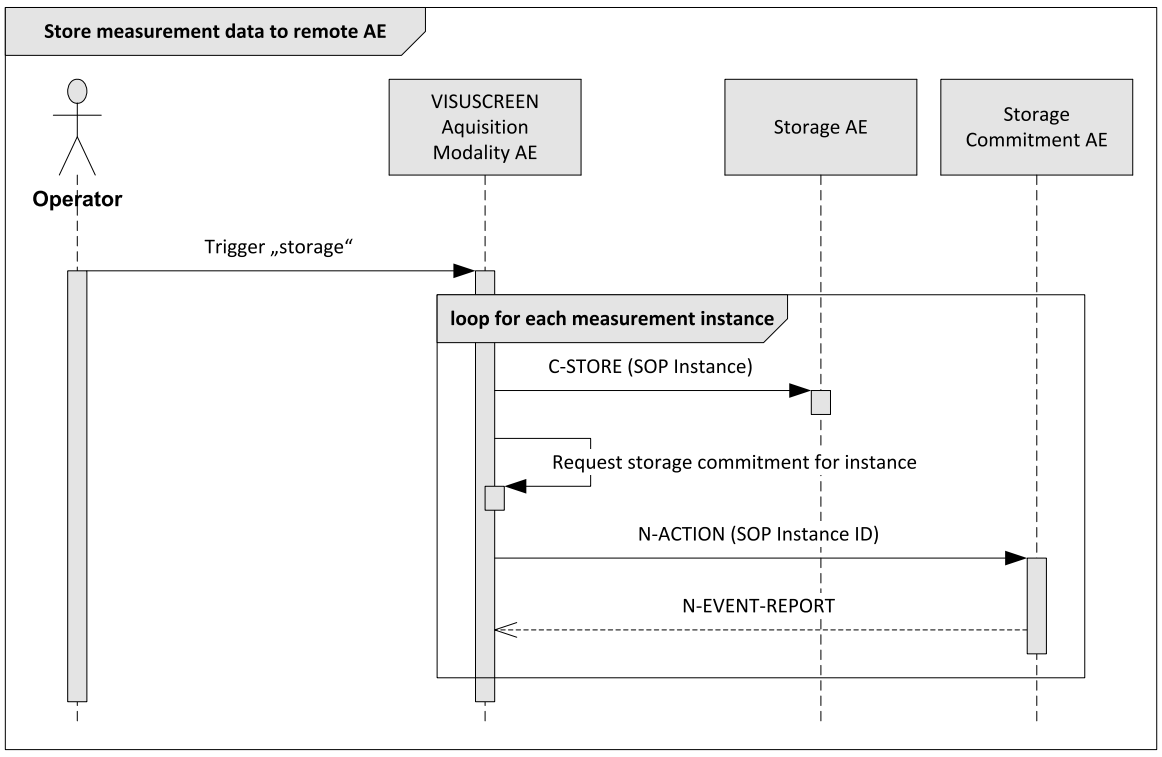
This activity has no direct relation to DICOM messaging.

During this activity, the Application Software creates measurement data. Measurement data will be stored as Subjective Refraction SOP Instances. The created data is subject to be archived within next “Store measurement data”-activity call.

4.2.1.3.7 Activity – Store measurement data to remote AE

4.2.1.3.7.1 Description and Sequencing of Activities

Figure 4-10 Store measurement data



Trigger “storage”

Pressing the ‘Save Results’ button on the user interface, where measurement data are displayed, triggers a Storage request. Any Storage request triggers automatically a subsequent Storage Commitment request.

Request Storage Commitment

To verify that the data has been safely archived, the Application Software request the configured Storage Commitment AE after each storage request to commit the storage of instances.

4.2.1.3.7.2 Proposed Presentation Contexts

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

- Storage Commitment Push Model with Transfer Syntax ILE as SCU

Table 4-26 Presentation Contexts proposed by VISUSCREEN AE

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	No

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Lensometry Measurements Storage	5.1.4.1.1.78.1	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Autorefraction Measurements Storage	5.1.4.1.1.78.2	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Subjective Refraction Measurements Storage	5.1.4.1.1.78.4	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Raw Data Storage[3]	5.1.4.1.1.66	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	No

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

Note 2: Only acts as SCP when a C-MOVE-RQ was initiated first and this association is still open.

Note 3: More SOP Classes are negotiated by application then are used.

The FORUM driver makes use of the attribute Modalities_in study in order to query studies for a specific modality. That means a relational query is used for a Study Root query.

4.2.1.3.7.3 SOP Specific Conformance for Storage SOP Classes

Table 4-27 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	Refused: SOP class not supported	0122	Log message and do not retry. Message to user.

Service Status	Further Meaning	Status Code	Behavior
Warning	Coercion of data Elements	B000	Log message and do not retry. Message to user.
Warning	Data Set does not match SOP Class	B007	Log message and do not retry. Message to user.
Warning	Elements Discarded	B006	Log message and do not retry. Message to user.
Success	Successful Storage	0000	None
Unknown	All other responses with unknown code	xxxx	Log message and do not retry. Message to user.

4.2.1.3.7.4 SOP Specific Conformance for Storage Commitment SOP Class

4.2.1.3.7.4.1 Storage Commitment Operations (N-ACTION)

All storage requests to the DICOM archive are automatically followed by a Storage Commitment request.

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

Table 4-28 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 and display user alert.
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 and display user alert.
Failure	Processing failure	0110	Log message and display user alert.
Failure	Resource limitation	0213	Log message and display user alert.
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.

4.2.1.3.7.4.2 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.

4.2.1.4 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.

The FORUM driver can respond to a Verification command coming from another DICOM component, for instance coming from FORUM.

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 4-29 Presentation Context accepted by the VISUSCREEN AE

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	No

4.2.1.4.1.3 SOP Specific Conformance for Verification SOP Class as SCP

The Application Software AE provides standard conformance.

4.2.1.4.1 Activity – Retrieve measurement data from remote AE

This chapter describes the aspect of association acceptance of the activity “Retrieve measurement data from remote AE”. The activity retrieves measurement data belonging to a selected patient.

4.2.1.4.1.1 Description and Sequencing of Activities

The description and sequencing of activities covered by chapter 4.2.1.3.5 Activity – Retrieve measurement data from remote AE.

4.2.1.4.1.2 Accepted Presentation Contexts

Table 4-30 Presentation Contexts accepted by the VISUSCREEN AE

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	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Lensometry Measurements Storage	5.1.4.1.1.78.1	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Autorefraction Measurements Storage	5.1.4.1.1.78.2	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Keratometry Measurements Storage	5.1.4.1.1.78.3	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Subjective Refraction Measurements Storage	5.1.4.1.1.78.4	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Raw Data Storage[3]	5.1.4.1.1.66	ILE	1.2	BOTH[2]	No
		ELE	1.2.1	BOTH[2]	No
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes See Note 1
Study Root Query/Retrieve IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	No

Note 1: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.
Note 2: Only acts as SCP when a C-MOVE-RQ was initiated first and this association is still open.
Note 3: More SOP Classes are negotiated by application then are used.

4.2.1.4.1.3 SOP Specific Conformance for Storage SOP Class as SCP

The Application Software AE provides standard conformance.

4.2.1.4.2 Activity – Store measurement data to remote AE

The software uses a Storage function for measurement data. There is no Storage of images..

4.2.1.4.2.1 Description and Sequencing of Activities

The description and sequencing of activities is covered by chapter 4.2.1.3.7Activity – Store measurement data to remote AE.

4.2.1.4.2.2 Accepted Presentation Contexts

Table 4-31 Presentation Contexts accepted by the VISUSCREEN AE

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	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No

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.

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

The VISUSCREEN supports IPv4 as well as IPv6 Addresses.

4.4 Configuration

The configuration file nim.config.xml resides in the configuration directory. The VISUSCREEN service GUI contains a screen to configure the parameters listed in a later section named “Parameters”.

4.4.1 AE Title/Presentation Address Mapping

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

4.4.1.1 Local AE Titles

The IP is not configurable by the Configuration Tool. The IP is administrated by the Operating System. The Application Entity Title as well as the port number is configurable. The default port number is 11112.

4.4.1.2 Remote AE Titles

The mapping of external AE Titles to TCP/IP addresses and ports is configurable. The VISUSCREEN 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.

4.4.2 Parameters

4.4.2.1 General Parameters

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

Table 4-32 Configuration Parameters Table

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
DIMSE RSP Timout	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	Error
Storage Commitment for failed instances	No	
(0008,0080) Institution Name	No	
(0008,1040) Institutional Department Name	No	
(0008,0081) Institution Address	No	
(0008,1010) Station Name	No	
(0010,0021) Issuer of Patient ID	No	
Use multiple character sets	No	
Modality Worklist SCU Parameters		
Maximum Query Responses (Modality Worklist IM, Patient Root Q/R IM and Study Root Q/R IM)	Yes (10-999)	999
Patient Root Q/R and Study Root Q/R SCU Parameters		
Maximum Query Responses (Modality Worklist IM, Patient Root Q/R IM and Study Root Q/R IM)	Yes (10-999)	999
Storage Commitment SCU Parameters		
Storage Commitment is always enabled		
Max, Repetition Steps	No	3
Repetition interval	No	3 sec
Storage SCU Parameters		
No specific configuration required		
Storage SCP Parameters		
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).		

Parameter	Configurable (Yes/No)	Default Value
Verification SCP Parameters		
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).		

5 Media Interchange

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

6 Support of Character Sets

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

Table 6-1 Supported Character Set

Supported Specific Character Set	
Character Set Description	**Defined Term**
UTF-8 encoded Unicode	ISO_IR 192

7 Security

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

It is assumed that VISUSCREEN 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 VISUSCREEN Application Software

Firewall or router protections to ensure that VISUSCREEN 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 sources of data come from data acquisition process. Include Image and data relate to Image

ANALYSIS
The sources of data come from data generate by application or add/edit/update by user when images are analyzed.

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

8.1.1.1 Subjective Refraction Measurements Information Object Definition

IE	Module	Usage
Patient		
	Patient	ALWAYS
Study		
	General Study	ALWAYS
Series		
	General Series	ALWAYS
	Subjective Refraction Measurements Series	ALWAYS
Equipment		
	Enhanced General Equipment	ALWAYS
Measurements		
	General Ophthalmic Refractive Measurements	ALWAYS
	Subjective Refraction Measurements	ALWAYS
	Visuphor Visual Acuity Measurements	ALWAYS
	Sop Common	ALWAYS

Table 8-1 Subjective Refraction Measurements IOD - Module "Patient"

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name.	ALWAYS	MWL, QR
(0010,0020)	2	LO	Patient ID	Primary hospital identification number or code for the patient.	ALWAYS	MWL, QR
(0010,0021)	3	LO	Issuer of Patient ID	The issuer of patient ID is mandatory and required. MWL and Query responses are rejected in case Issuer of Patient ID is empty.	ALWAYS	MWL, QR
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the patient.	ALWAYS	MWL, QR
(0010,0040)	2	CS	Patient's Sex	Sex of the named patient. Enumerated Values: M = male F = female O = other	ALWAYS	MWL, QR
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the patient.	ANAP	MWL, QR
(0010,4000)	3	LT	Patient Comments	User-defined additional information about the patient.	ANAP	MWL, QR

Table 8-2 Subjective Refraction Measurements IOD - Module "General Study"

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

Tag	Type	VR	Name	Description	PoV	Source
(0008,0020)	2	DA	Study Date	Date the Study started.	ALWAYS	ACQUISITION
(0008,0030)	2	TM	Study Time	Time the Study started.	ALWAYS	ACQUISITION
(0008,0090)	2	PN	Referring Physician's Name	Name of the patient's referring physician	VNAP	MWL
(0020,0010)	2	SH	Study ID	User or equipment generated Study identifier.	ALWAYS	MWL, AUTO
(0008,0050)	2	SH	Accession Number	A RIS generated number that identifies the order for the Study.	VNAP	MWL
(0008,1030)	3	LO	Study Description	Institution-generated description or classification of the Study (component) performed.	ANAP	MWL
(0008,1110)	3	SQ	Referenced Study Sequence	A sequence that provides reference to a Study SOP Class/Instance pair. One or more Items are permitted in this Sequence.	ANAP	MWL
>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class.	ANAP	MWL
>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ANAP	MWL
(0008,1032)	3	SQ	Procedure Code Sequence	A Sequence that conveys the type of procedure performed. One or more Items are permitted in this Sequence.	ANAP	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.	ANAP	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.	ANAP	MWL

Table 8-3 Subjective Refraction Measurements IOD - Module "General Series"

Tag	Type	VR	Name	Description	PoV	Source
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. ID-Root = 1.2.276.0.75.2.1.60.1.2	ALWAYS	AUTO
(0020,0011)	2	IS	Series Number	A number that identifies this Series. ID-Root = 0	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

Tag	Type	VR	Name	Description	PoV	Source
(0018,1030)	3	LO	Protocol Name	User-defined description of the conditions under which the Series was performed. Note: This attribute conveys series-specific protocol identification and may or may not be identical to the one presented in the Performed Protocol Code Sequence (0040,0260).	ALWAYS	AUTO
(0008,103E)	3	LO	Series Description	Description of the Series . Value = Routine diagnostics measurement	ALWAYS	AUTO
(0040,0275)	3	SQ	Request Attributes Sequence	Sequence that contains attributes from the Imaging Service Request. One or more Items are permitted in this sequence.	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.	ANAP	MWL
>(0032,1060)	3	LO	Requested Procedure Description	Institution-generated administrative description or classification of Requested Procedure.	ANAP	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.	ANAP	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.	ANAP	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Value = CZM-FORUM	ANAP	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.	ANAP	MWL

Tag	Type	VR	Name	Description	PoV	Source
(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.	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. Value = Routine diagnostics measurement	ALWAYS	AUTO

Table 8-4 Subjective Refraction Measurements IOD - Module "Subjective Refraction 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: SRF See NEMA PS3.3 Section C.7.3.1.1.1 for further explanation. Value = SRF	ALWAYS	AUTO

Table 8-5 Subjective Refraction Measurements IOD - 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	AUTO
(0008,1090)	1	LO	Manufacturer's Model Name	Manufacturer’s model name of the equipment that produced the composite instances.	ALWAYS	ACQUISITION
(0018,1000)	1	LO	Device Serial Number	Manufacturer’s serial number of the equipment that produced the composite instances.	ALWAYS	ACQUISITION
(0018,1020)	1	LO	Software Version(s)	Manufacturer’s designation of software version of the equipment that produced the composite instances. • FORUM Driver Version: 2.4.0.0 and higher versions of 2.x.y.z. • CZM NIM, 2.8.0 and higher versions of 2.x.y. • XML Schema Version connectivity interface 1.1.7 and higher versions of 1.x.y. • Firmware version installed on VISUSCREEN	ALWAYS	AUTO

Table 8-6 Subjective Refraction Measurements IOD - 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
(0020,4000)	3	LT	Image Comments	User-defined comments about this SOP Instance.	ALWAYS	AUTO

Table 8-7 Subjective Refraction Measurements IOD - Module "Subjective Refraction Measurements"

Tag	Type	VR	Name	Description	PoV	Source
(0046,0097)	1C	SQ	Subjective Refraction Right Eye Sequence	A sequence that specifies the subjective refractive 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	ACQUISITION
>(0046,0146)	1	FD	Sphere Power	Refractive power of the eye that is the same in all meridians, measured at distance (optical infinity), in diopters.	ANAP	ACQUISITION
>(0046,0018)	1C	SQ	Cylinder Sequence	A sequence that specifies lens measurements to correct for astigmatism or measurements of an eye that has astigmatism. Required if astigmatic correction or astigmatism is measured. Only a single item shall be included in this sequence. Note: When astigmatism is present the power is NOT the same in all meridians, but has its minimum and maximum power in meridians separated by 90 degrees.	ANAP	ACQUISITION
>>(0046,0147)	1	FD	Cylinder Power	The power that is present at the power meridian (90 degrees from the axis), in diopters.	ANAP	ACQUISITION
>>(0022,0009)	1	FL	Cylinder Axis	The meridian, defined in degrees, that is 90 degrees from the power meridian.	ANAP	ACQUISITION
>(0046,0028)	1C	SQ	Prism Sequence	A sequence that specifies prism that is measured in a lens, or that is required to correct for a patient's ocular misalignment. Required if prism is measured in the lens or if this part of a refraction is done for a patient. Only a single item shall be included in this sequence. Note: A prism is a wedge shaped lens that deviates light toward the base and shifts the apparent image toward its apex.	ANAP	ACQUISITION
>>(0046,0030)	1	FD	Horizontal Prism Power	The power of a prism to bend light in the horizontal direction, in prism diopters.	ANAP	ACQUISITION
>>(0046,0032)	1	CS	Horizontal Prism Base	Direction of the base of the measured prism -- either in (toward the nose), or out (away from the nose) Enumerated Value: IN OUT	ANAP	ACQUISITION
>>(0046,0034)	1	FD	Vertical Prism Power	The power of a prism to bend light in the vertical direction, in prism diopters.	ANAP	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>>(0046,0036)	1	CS	Vertical Prism Base	Direction of the base of the measured prism -- either up, or down. Enumerated Value: UP DOWN	ANAP	ACQUISITION
>(0046,0100)	1C	SQ	Add Near Sequence	A sequence that specifies refractive measurements of the eye to correct for inability to focus at near while wearing the distance prescription. Only a single item shall be included in this sequence. Required if near point refraction is done.	ANAP	ACQUISITION
>>(0046,0104)	1	FD	Add Power	Additional power relative to the distance correction, expressed in diopters, that allows best corrected visual acuity at the defined viewing distance.	ANAP	ACQUISITION
>>(0046,0106)	3	FD	Viewing Distance	The distance, in cm, for testing visual acuity corresponding to the value of Add Power (0046,0104) in this sequence.	ANAP	ACQUISITION
(0046,0098)	1C	SQ	Subjective Refraction Left Eye Sequence	A sequence that specifies the subjective refractive 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	ACQUISITION
>(0046,0146)	1	FD	Sphere Power	Refractive power of the eye that is the same in all meridians, measured at distance (optical infinity), in diopters.	ANAP	ACQUISITION
>(0046,0018)	1C	SQ	Cylinder Sequence	A sequence that specifies lens measurements to correct for astigmatism or measurements of an eye that has astigmatism. Required if astigmatic correction or astigmatism is measured. Only a single item shall be included in this sequence. Note: When astigmatism is present the power is NOT the same in all meridians, but has its minimum and maximum power in meridians separated by 90 degrees.	ANAP	ACQUISITION
>>(0046,0147)	1	FD	Cylinder Power	The power that is present at the power meridian (90 degrees from the axis), in diopters.	ANAP	ACQUISITION
>>(0022,0009)	1	FL	Cylinder Axis	The meridian, defined in degrees, that is 90 degrees from the power meridian.	ANAP	ACQUISITION
>(0046,0028)	1C	SQ	Prism Sequence	A sequence that specifies prism that is measured in a lens, or that is required to correct for a patient's ocular misalignment. Required if prism is measured in the lens or if this part of a refraction is done for a patient. Only a single item shall be included in this sequence. Note: A prism is a wedge shaped lens that deviates light toward the base and shifts the apparent image toward its apex.	ANAP	ACQUISITION
>>(0046,0030)	1	FD	Horizontal Prism Power	The power of a prism to bend light in the horizontal direction, in prism diopters.	ANAP	ACQUISITION
>>(0046,0032)	1	CS	Horizontal Prism Base	Direction of the base of the measured prism -- either in (toward the nose), or out (away from the nose) Enumerated Value: IN OUT	ANAP	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>>(0046,0034)	1	FD	Vertical Prism Power	The power of a prism to bend light in the vertical direction, in prism diopters.	ANAP	ACQUISITION
>>(0046,0036)	1	CS	Vertical Prism Base	Direction of the base of the measured prism -- either up, or down. Enumerated Value: UP DOWN	ANAP	ACQUISITION
>(0046,0100)	1C	SQ	Add Near Sequence	A sequence that specifies refractive measurements of the eye to correct for inability to focus at near while wearing the distance prescription. Only a single item shall be included in this sequence. Required if near point refraction is done.	ANAP	ACQUISITION
>>(0046,0104)	1	FD	Add Power	Additional power relative to the distance correction, expressed in diopters, that allows best corrected visual acuity at the defined viewing distance.	ANAP	ACQUISITION
>>(0046,0106)	3	FD	Viewing Distance	The distance, in cm, for testing visual acuity corresponding to the value of Add Power (0046,0104) in this sequence.	ANAP	ACQUISITION

Table 8-8 Subjective Refraction Measurements IOD - Module " Visuphor Visual Acuity Measurements"

Tag	Type	VR	Name	Description	PoV	Source
(2701,xx00)	3	SQ	Visual Acuity Distance Sequence	A sequence that specifies the subjective measurement of a patient's visual acuity from the distance Contains only one item.	ANAP	ACQUISITION
>(2701,xx004)	3	SQ	Visual Acuity Right Eye Sequence	A sequence that specifies the subjective measurement of a patient's visual acuity for the right eye..Squence is present in case the right eye is measured. Contains only one single item.	ANAP	ACQUISITION
>>(2701,xx07)	1	FD	Decimal Visual Acuity	A patient's visual acuity specified in decimal. The value is derived from two values in a fraction where the numerator of the fraction is the nominal distance to the chart that the patient is reading. The denominator represents the line of smallest optotypes of which the patient can see more than half. Notes: 1. Typical examples--reference standard is 1, severe vision loss is 0.1 2. 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.	ANAP	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>>(2701,xx08)	3	SS	Visual Acuity Modifiers	The first value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 used to indicate that the patient missed letters on the line referenced, or saw additional letters on the next smaller line. The second value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 which in combination with the first value indicates that the patient both saw additional letters on the next smaller line and missed letters on the line referenced. Notes: 1. When the modifier values are zero, the values are not typically displayed to the user. 2. See PS 3.17 Ophthalmic Refractive Reports Use Cases for guidance regarding significance of modifiers.	ANAP	ACQUISITION
>(2701,xx05)	3	SQ	Visual Acuity Left Eye Sequence	A sequence that specifies the subjective measurements of a patient's visual acuity for the left eye..Sequence is present in case the left eye is measured. Contains only one single item.	ANAP	ACQUISITION
>>(2701,xx07)	1	FD	Decimal Visual Acuity	A patient's visual acuity specified in decimal. The value is derived from two values in a fraction where the numerator of the fraction is the nominal distance to the chart that the patient is reading. The denominator represents the line of smallest optotypes of which the patient can see more than half. Notes: 1. Typical examples--reference standard is 1, severe vision loss is 0.1 2. 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.	ANAP	ACQUISITION
>>(2701,xx08)	3	SS	Visual Acuity Modifiers	The first value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 used to indicate that the patient missed letters on the line referenced, or saw additional letters on the next smaller line. The second value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 which in combination with the first value indicates that the patient both saw additional letters on the next smaller line and missed letters on the line referenced. Notes: 1. When the modifier values are zero, the values are not typically displayed to the user. 2. See PS 3.17 Ophthalmic Refractive Reports Use Cases for guidance regarding significance of modifiers.	ANAP	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>(2701,xx06)	3	SQ	Visual Acuity Both Eyes Open Sequence	A sequence that specifies a patient's subjective visual acuity measurements with both eyes open. Contains only one single item..	ANAP	ACQUISITION
>>(2701,xx07)	1	FD	Decimal Visual Acuity	A patient's visual acuity specified in decimal. The value is derived from two values in a fraction where the numerator of the fraction is the nominal distance to the chart that the patient is reading. The denominator represents the line of smallest optotypes of which the patient can see more than half. Notes: 1. Typical examples--reference standard is 1, severe vision loss is 0.1 2. 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.	ANAP	ACQUISITION
>>(2701,xx08)	3	SS	Visual Acuity Modifiers	The first value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 used to indicate that the patient missed letters on the line referenced, or saw additional letters on the next smaller line. The second value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 which in combination with the first value indicates that the patient both saw additional letters on the next smaller line and missed letters on the line referenced. Notes: 1. When the modifier values are zero, the values are not typically displayed to the user. 2. See PS 3.17 Ophthalmic Refractive Reports Use Cases for guidance regarding significance of modifiers.	ANAP	ACQUISITION
>(0046,xx01)	3	SQ	Visual Acuity Near Sequence	A sequence that specifies the subjective measurement of a patient's visual acuity for the near viewing distance condition. Contains only one item.	ANAP	ACQUISITION
>(2701,xx04)	3	SQ	Visual Acuity Right Eye Sequence	A sequence that specifies the subjective measurement of a patient's visual acuity for the right eye. Sequence is present in case the right eye is measured. Contains only one single item.	ANAP	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>>(2701,xx07)	1	FD	Decimal Visual Acuity	A patient's visual acuity specified in decimal. The value is derived from two values in a fraction where the numerator of the fraction is the nominal distance to the chart that the patient is reading. The denominator represents the line of smallest optotypes of which the patient can see more than half. Notes: 1. Typical examples--reference standard is 1, severe vision loss is 0.1 2. 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.	ANAP	ACQUISITION
>>(2701,xx08)	3	SS	Visual Acuity Modifiers	The first value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 used to indicate that the patient missed letters on the line referenced, or saw additional letters on the next smaller line. The second value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 which in combination with the first value indicates that the patient both saw additional letters on the next smaller line and missed letters on the line referenced. Notes: 1. When the modifier values are zero, the values are not typically displayed to the user. 2. See PS 3.17 Ophthalmic Refractive Reports Use Cases for guidance regarding significance of modifiers.	ANAP	ACQUISITION
>(2701,xx05)	3	SQ	Visual Acuity Left Eye Sequence	A sequence that specifies the subjective measurements of a patient's visual acuity for the left eye. Sequence is present in case the left eye is measured. Contains only one single item.	ANAP	ACQUISITION
>>(2701,xx07)	1	FD	Decimal Visual Acuity	A patient's visual acuity specified in decimal. The value is derived from two values in a fraction where the numerator of the fraction is the nominal distance to the chart that the patient is reading. The denominator represents the line of smallest optotypes of which the patient can see more than half. Notes: 1. Typical examples--reference standard is 1, severe vision loss is 0.1 2. 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.	ANAP	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>>(2701,xx08)	3	SS	Visual Acuity Modifiers	The first value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 used to indicate that the patient missed letters on the line referenced, or saw additional letters on the next smaller line. The second value is a positive or negative integer numeric value such as +1, +2, +3, 0, -1, -2, or -3 which in combination with the first value indicates that the patient both saw additional letters on the next smaller line and missed letters on the line referenced. Notes: 1. When the modifier values are zero, the values are not typically displayed to the user. 2. See PS 3.17 Ophthalmic Refractive Reports Use Cases for guidance regarding significance of modifiers.	ANAP	ACQUISITION

Table 8-9 Subjective Refraction 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 C.12.1.1.1 for further explanation. See also PS 3.4. Value = 1.2.840.10008.5.1.4.1.1.78.4	ALWAYS	CONFIG
(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
(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 C.12.1.1.2 for Defined Terms.	ALWAYS	AUTO
(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

Tag	Type	VR	Name	Description	PoV	Source
(0008,0201)	3	SH	Timezone Offset From UTC	Contains the offset from UTC to the timezone for all DA and TM Attributes present in this SOP Instance, and for all DT Attributes present in this SOP Instance that do not contain an explicitly encoded timezone offset. Encoded as an ASCII string in the format "&ZZXX". The components of this string, from left to right, are & = "+" or "-", and ZZ = Hours and XX = Minutes of offset. Leading space characters shall not be present. The offset for UTC shall be +0000; -0000 shall not be used. Notes: 1. This encoding is the same as described in PS 3.5 for the offset component of the DT Value Representation. 2. This Attribute does not apply to values with a DT Value Representation, that contains an explicitly encoded timezone offset. 3. The corrected time may cross a 24 hour boundary. For example, if Local Time = 1.00 a.m. and Offset = +0200, then UTC = 11.00 p.m. (23.00) the day before. 4. The "+" sign may not be omitted. Time earlier than UTC is expressed as a negative offset. Note: For example: UTC = 5.00 a.m. Local Time = 3.00 a.m. Offset = -0200 The local timezone offset is undefined if this Attribute is absent.	ALWAYS	AUTO

8.1.1.2 Autorefraction Measurements Information Object Definition

IE	Module	Usage
Patient		
	Patient	ALWAYS
Study		
	General Study	ALWAYS
Series		
	General Series	ALWAYS
	Autorefraction Measurements Series	ALWAYS
Equipment		
	Enhanced General Equipment	ALWAYS
Measurements		
	General Ophthalmic Refractive Measurements	ALWAYS
	Autorefraction Measurements	ALWAYS
	Sop Common	ALWAYS

Table 8-10 Autorefraction Measurements IOD - Module "Patient"

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name.	ALWAYS	MWL, QR
(0010,0020)	2	LO	Patient ID	Primary hospital identification number or code for the patient.	ALWAYS	MWL, QR
(0010,0021)	3	LO	Issuer of Patient ID	The issuer of patient ID is mandatory and required. MWL and Query responses are rejected in case Issuer of Patient ID is empty.	ALWAYS	MWL, QR
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the patient.	ALWAYS	MWL, QR
(0010,0040)	2	CS	Patient's Sex	Sex of the named patient. Enumerated Values: M = male F = female O = other	ALWAYS	MWL, QR
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the patient.	ANAP	MWL, QR
(0010,4000)	3	LT	Patient Comments	User-defined additional information about the patient.	ANAP	MWL, QR

Table 8-11 Autorefraction Measurements IOD - Module "General Study"

Tag	Type	VR	Name	Description	PoV	Source
(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study. ID-Root = 1.2.276.0.75.2	ALWAYS	AUTO
(0008,0020)	2	DA	Study Date	Date the Study started.	ALWAYS	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
(0008,0030)	2	TM	Study Time	Time the Study started.	ALWAYS	ACQUISITION
(0008,0090)	2	PN	Referring Physician's Name	Name of the patient's referring physician	EMPTY	AUTO
(0020,0010)	2	SH	Study ID	User or equipment generated Study identifier. ID-Root = 0	ALWAYS	MWL, AUTO
(0008,0050)	2	SH	Accession Number	A RIS generated number that identifies the order for the Study.	EMPTY	AUTO
(0008,1030)	3	LO	Study Description	Institution-generated description or classification of the Study (component) performed.	ANAP	MWL
(0008,1110)	3	SQ	Referenced Study Sequence	A sequence that provides reference to a Study SOP Class/Instance pair. One or more Items are permitted in this Sequence.	ANAP	MWL
>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class.	ANAP	MWL
>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ANAP	MWL
(0008,1032)	3	SQ	Procedure Code Sequence	A Sequence that conveys the type of procedure performed. One or more Items are permitted in this Sequence.	ANAP	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.	ANAP	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.	ANAP	MWL

Table 8-12 Autorefraction Measurements IOD - Module "General Series"

Tag	Type	VR	Name	Description	PoV	Source
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. ID-Root = 1.2.276.0.75.2.1.60.1.2	ALWAYS	AUTO
(0020,0011)	2	IS	Series Number	A number that identifies this Series. ID-Root = 0	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

Tag	Type	VR	Name	Description	PoV	Source
(0018,1030)	3	LO	Protocol Name	User-defined description of the conditions under which the Series was performed. Note: This attribute conveys series-specific protocol identification and may or may not be identical to the one presented in the Performed Protocol Code Sequence (0040,0260).	ALWAYS	AUTO
(0008,103E)	3	LO	Series Description	Description of the Series. Value = Routine diagnostics measurement	ALWAYS	AUTO
(0040,0275)	3	SQ	Request Attributes Sequence	Sequence that contains attributes from the Imaging Service Request. One or more Items are permitted in this sequence.	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.	ANAP	MWL
>(0032,1060)	3	LO	Requested Procedure Description	Institution-generated administrative description or classification of Requested Procedure.	ANAP	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.	ANAP	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.	ANAP	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Value = CZM-FORUM	ANAP	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.	ANAP	MWL

Tag	Type	VR	Name	Description	PoV	Source
(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.	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. Value = Routine diagnostics measurement	ALWAYS	AUTO

Table 8-13 Autorefraction Measurements IOD - Module "Autorefraction 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: AR See NEMA PS3.3 Section C.7.3.1.1.1 for further explanation. Value = AR	ALWAYS	AUTO

Table 8-14 Autorefraction Measurements IOD - 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	AUTO
(0008,1090)	1	LO	Manufacturer's Model Name	Manufacturer’s model name of the equipment that produced the composite instances.	ALWAYS	ACQUISITION
(0018,1000)	1	LO	Device Serial Number	Manufacturer’s serial number of the equipment that produced the composite instances.	ALWAYS	ACQUISITION
(0018,1020)	1	LO	Software Version(s)	Manufacturer’s designation of software version of the equipment that produced the composite instances. • FORUM Driver Version: 2.4.0.0 and higher versions of 2.x.y.z. • CZM NIM, 2.8.0 and higher versions of 2.x.y. • XML Schema Version connectivity interface 1.1.7 and higher versions of 1.x.y. • Firmware version installed on VISUSCREEN	ALWAYS	AUTO

Table 8-15 Autorefraction Measurements IOD - 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
(0020,4000)	3	LT	Image Comments	User-defined comments about this SOP Instance.	ALWAYS	AUTO

Table 8-16 Autorefraction Measurements IOD - Module "Autorefraction Measurements"

Tag	Type	VR	Name	Description	PoV	Source
(0046,0050)	1C	SQ	Autorefraction Right Eye Sequence	A sequence that specifies refractive 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	ACQUISITION
>(0046,0146)	1	FD	Sphere Power	Refractive power of the eye that is the same in all meridians, measured at distance (optical infinity), in diopters.	ANAP	ACQUISITION
>(0046,0018)	1C	SQ	Cylinder Sequence	A sequence that specifies lens measurements to correct for astigmatism or measurements of an eye that has astigmatism. Required if astigmatic correction or astigmatism is measured. Only a single item shall be included in this sequence. Note: When astigmatism is present the power is NOT the same in all meridians, but has its minimum and maximum power in meridians separated by 90 degrees.	ANAP	ACQUISITION
>>(0046,0147)	1	FD	Cylinder Power	The power that is present at the power meridian (90 degrees from the axis), in diopters.	ANAP	ACQUISITION
>>(0022,0009)	1	FL	Cylinder Axis	The meridian, defined in degrees, that is 90 degrees from the power meridian.	ANAP	ACQUISITION
(0046,0052)	1C	SQ	Autorefraction Left Eye Sequence	A sequence that specifies refractive 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	ACQUISITION
>(0046,0146)	1	FD	Sphere Power	Refractive power of the eye that is the same in all meridians, measured at distance (optical infinity), in diopters.	ANAP	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>(0046,0018)	1C	SQ	Cylinder Sequence	A sequence that specifies lens measurements to correct for astigmatism or measurements of an eye that has astigmatism. Required if astigmatic correction or astigmatism is measured. Only a single item shall be included in this sequence. Note: When astigmatism is present the power is NOT the same in all meridians, but has its minimum and maximum power in meridians separated by 90 degrees.	ANAP	ACQUISITION
>>(0046,0147)	1	FD	Cylinder Power	The power that is present at the power meridian (90 degrees from the axis), in diopters.	ANAP	ACQUISITION
>>(0022,0009)	1	FL	Cylinder Axis	The meridian, defined in degrees, that is 90 degrees from the power meridian.	ANAP	ACQUISITION
(0046,0060)	3	FD	Distance Pupillary Distance	Distance in mm between the pupils when the patient’s object of regard is in the distance, as measured by an autorefractor.	ANAP	ACQUISITION

Table 8-17 Autorefraction 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 C.12.1.1.1 for further explanation. See also PS 3.4. Value = 1.2.840.10008.5.1.4.1.1.78.2	ALWAYS	CONFIG
(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
(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 C.12.1.1.2 for Defined Terms.	ALWAYS	AUTO
(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

Tag	Type	VR	Name	Description	PoV	Source
(0008,0201)	3	SH	Timezone Offset From UTC	Contains the offset from UTC to the timezone for all DA and TM Attributes present in this SOP Instance, and for all DT Attributes present in this SOP Instance that do not contain an explicitly encoded timezone offset. Encoded as an ASCII string in the format "&ZZXX". The components of this string, from left to right, are & = "+" or "-", and ZZ = Hours and XX = Minutes of offset. Leading space characters shall not be present. The offset for UTC shall be +0000; -0000 shall not be used. Notes: 1. This encoding is the same as described in PS 3.5 for the offset component of the DT Value Representation. 2. This Attribute does not apply to values with a DT Value Representation, that contains an explicitly encoded timezone offset. 3. The corrected time may cross a 24 hour boundary. For example, if Local Time = 1.00 a.m. and Offset = +0200, then UTC = 11.00 p.m. (23.00) the day before. 4. The "+" sign may not be omitted. Time earlier than UTC is expressed as a negative offset. Note: For example: UTC = 5.00 a.m. Local Time = 3.00 a.m. Offset = -0200 The local timezone offset is undefined if this Attribute is absent.	ALWAYS	AUTO

8.1.1.3 Keratometry Measurements Information Object Definition

IE Module		Usage
Patient		
	Patient	ALWAYS
Study		
	General Study	ALWAYS
Series		
	General Series	ALWAYS
	Keratometry Measurements Series	ALWAYS
Equipment		
	Enhanced General Equipment	ALWAYS
Measurements		
	General Ophthalmic Refractive Measurements	ALWAYS
	Keratometry Measurements	ALWAYS
	Sop Common	ALWAYS

Table 8-18 Keratometry Measurements IOD - Module "Patient"

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name.	ALWAYS	MWL, QR
(0010,0020)	2	LO	Patient ID	Primary hospital identification number or code for the patient.	ALWAYS	MWL, QR
(0010,0021)	3	LO	Issuer of Patient ID	The issuer of patient ID is mandatory and required. MWL and Query responses are rejected in case Issuer of Patient ID is empty.	ALWAYS	MWL, QR
>>(0008,0100)	1	SH	Code Value	See NEMA PS3.3 Section 8.1. Value = SC	ANAP	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Value = CZM-FORUM	ANAP	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.	ANAP	MWL
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the patient.	ALWAYS	MWL, QR
(0010,0040)	2	CS	Patient's Sex	Sex of the named patient. Enumerated Values: M = male F = female O = other	ALWAYS	MWL, QR

Tag	Type	VR	Name	Description	PoV	Source
(0010,1000)	3	LO	Other Patient IDs	Other identification numbers or codes used to identify the patient.	ANAP	MWL, QR
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the patient.	ANAP	MWL, QR
(0010,4000)	3	LT	Patient Comments	User-defined additional information about the patient.	ANAP	MWL, QR

Table 8-19 Keratometry Measurements IOD - Module "General Study"

Tag	Type	VR	Name	Description	PoV	Source
(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study.	ALWAYS	AUTO
(0008,0020)	2	DA	Study Date	Date the Study started.	ALWAYS	ACQUISITION
(0008,0030)	2	TM	Study Time	Time the Study started.	ALWAYS	ACQUISITION
(0008,0090)	2	PN	Referring Physician's Name	Name of the patient's referring physician	EMPTY	AUTO
(0020,0010)	2	SH	Study ID	User or equipment generated Study identifier.	ALWAYS	AUTO, MWL
(0008,0050)	2	SH	Accession Number	A RIS generated number that identifies the order for the Study.	EMPTY	AUTO
(0008,1030)	3	LO	Study Description	Institution-generated description or classification of the Study (component) performed.	ANAP	MWL
(0008,1110)	3	SQ	Referenced Study Sequence	A sequence that provides reference to a Study SOP Class/Instance pair. One or more Items are permitted in this Sequence.	ANAP	MWL
>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class.	ANAP	MWL
>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ANAP	MWL
(0008,1032)	3	SQ	Procedure Code Sequence	A Sequence that conveys the type of procedure performed. One or more Items are permitted in this Sequence.	ANAP	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.	ANAP	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.	ANAP	MWL

Table 8-20 Keratometry Measurements IOD - Module "General Series"

Tag	Type	VR	Name	Description	PoV	Source
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. ID-Root = 1.2.276.0.75.2.1.60.1.2	ALWAYS	AUTO
(0020,0011)	2	IS	Series Number	A number that identifies this Series. ID-Root = 0	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
(0018,1030)	3	LO	Protocol Name	User-defined description of the conditions under which the Series was performed. Note: This attribute conveys series-specific protocol identification and may or may not be identical to the one presented in the Performed Protocol Code Sequence (0040,0260).	ALWAYS	AUTO
(0008,103E)	3	LO	Series Description	Description of the Series	ALWAYS	AUTO

Table 8-21 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.7.3.1.1.1 for further explanation. Value = KER	ALWAYS	AUTO

Table 8-22 Keratometry Measurements IOD - 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	AUTO
(0008,1090)	1	LO	Manufacturer's Model Name	Manufacturer’s model name of the equipment that produced the composite instances: Carl Zeiss Meditec	ALWAYS	ACQUISITION
(0018,1000)	1	LO	Device Serial Number	Manufacturer’s serial number of the equipment that produced the composite instances.	ALWAYS	AUTO
(0018,1020)	1	LO	Software Version(s)	Manufacturer’s designation of software version of the equipment that produced the composite instances. • FORUM Driver Version: 2.4.0.0 and higher versions of 2.x.y.z. • CZM NIM, 2.8.0 and higher versions of 2.x.y. • XML Schema Version connectivity interface 1.1.7 and higher versions of 1.x.y. • Firmware version installed on VISUSCREEN	ALWAYS	AUTO

Table 8-23 Keratometry Measurements IOD - 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

Table 8-24 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	ACQUISITION
>(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.	ANAP	ACQUISITION
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ANAP	ACQUISITION
>>(0046,0076)	1	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ANAP	ACQUISITION
>>(0046,0077)	1	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ANAP	ACQUISITION
>(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.	ANAP	ACQUISITION
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ANAP	ACQUISITION
>>(0046,0076)	1	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ANAP	ACQUISITION
>>(0046,0077)	1	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ANAP	ACQUISITION
(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	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>(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.	ANAP	ACQUISITION
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ANAP	ACQUISITION
>>(0046,0076)	1	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ANAP	ACQUISITION
>>(0046,0077)	1	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ANAP	ACQUISITION
>(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.	ANAP	ACQUISITION
>>(0046,0075)	1	FD	Radius of Curvature	The radius of curvature of the principal meridians of the cornea, measured in mm.	ANAP	ACQUISITION
>>(0046,0076)	1	FD	Keratometric Power	The refractive power of the cornea at the principal meridians, measured in diopters.	ANAP	ACQUISITION
>>(0046,0077)	1	FD	Keratometric Axis	The meridian where the keratometric radius of curvature or power is measured, in degrees.	ANAP	ACQUISITION

Table 8-25 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 C.12.1.1.1 for further explanation. See also PS 3.4., value = 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 C.12.1.1.1 for further explanation. See also PS 3.4.	ALWAYS	AUTO

8.1.1.4 Lensometry Measurements Information Object Definition

IE	Module	Usage
Patient		
	Patient	ALWAYS
Study		
	General Study	ALWAYS
Series		
	General Series	ALWAYS
	Lensometry Measurements Series	ALWAYS
Equipment		
	General Equipment	ALWAYS
	Enhanced General Equipment	ALWAYS
Measurements		
	General Ophthalmic Refractive Measurements	ALWAYS
	Lensometry Measurements	ALWAYS
	Visulens Lensometry Measurements	ALWAYS
	Sop Common	ALWAYS

Table 8-26 Lensometry Measurements IOD - Module "Patient"

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name.	ALWAYS	MWL, QR
(0010,0020)	2	LO	Patient ID	Primary hospital identification number or code for the patient.	ALWAYS	MWL, QR
(0010,0021)	3	LO	Issuer of Patient ID	The issuer of patient ID is mandatory and required. MWL and Query responses are rejected in case Issuer of Patient ID is empty.	ALWAYS	MWL, QR
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the patient.	VNAP	MWL, QR
(0010,0040)	2	CS	Patient's Sex	Sex of the named patient. Enumerated Values: M = male F = female O = other	VNAP	MWL, QR
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the patient.	ANAP	MWL, QR
(0010,4000)	3	LT	Patient Comments	User-defined additional information about the patient.	ANAP	MWL, QR

Table 8-27 Lensometry Measurements IOD - Module "General Study"

Tag	Type	VR	Name	Description	PoV	Source
(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study. . ID-Root = 1.2.276.0.75.2	ALWAYS	AUTO
(0008,0020)	2	DA	Study Date	Date the Study started.	ALWAYS	ACQUISITION
(0008,0030)	2	TM	Study Time	Time the Study started.	ALWAYS	ACQUISITION
(0008,0090)	2	PN	Referring Physician's Name	Name of the patient's referring physician	VNAP	MWL
(0020,0010)	2	SH	Study ID	User or equipment generated Study identifier. ID-Root = 0	ALWAYS	MWL, AUTO
(0008,0050)	2	SH	Accession Number	A RIS generated number that identifies the order for the Study.	VNAP	MWL
(0008,1030)	3	LO	Study Description	Institution-generated description or classification of the Study (component) performed.	ANAP	MWL
(0008,1110)	3	SQ	Referenced Study Sequence	A sequence that provides reference to a Study SOP Class/Instance pair. One or more Items are permitted in this Sequence.	ANAP	MWL
>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class.	ANAP	MWL
>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance.	ANAP	MWL
(0008,1032)	3	SQ	Procedure Code Sequence	A Sequence that conveys the type of procedure performed. One or more Items are permitted in this Sequence.	ANAP	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.	ANAP	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.	ANAP	MWL

Table 8-28 Lensometry Measurements IOD - Module "General Series"

Tag	Type	VR	Name	Description	PoV	Source
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. ID-Root = 1.2.276.0.75.2.1.60.1.2	ALWAYS	AUTO
(0020,0011)	2	IS	Series Number	A number that identifies this Series. ID-Root = 0	ALWAYS	AUTO
(0008,0021)	3	DA	Series Date	Date the Series started.	ALWAYS	AUTO

Tag	Type	VR	Name	Description	PoV	Source
(0008,0031)	3	TM	Series Time	Time the Series started.	ALWAYS	AUTO
(0018,1030)	3	LO	Protocol Name	User-defined description of the conditions under which the Series was performed. Note: This attribute conveys series-specific protocol identification and may or may not be identical to the one presented in the Performed Protocol Code Sequence (0040,0260).	ALWAYS	AUTO
(0008,103E)	3	LO	Series Description	Description of the Series. Value = Routine diagnostics measurement	ALWAYS	AUTO
(0040,0275)	3	SQ	Request Attributes Sequence	Sequence that contains attributes from the Imaging Service Request. One or more Items are permitted in this sequence.	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.	ANAP	MWL
>(0032,1060)	3	LO	Requested Procedure Description	Institution-generated administrative description or classification of Requested Procedure.	ANAP	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.	ANAP	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.	ANAP	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	See NEMA PS3.3 Section 8.2. Value = CZM-FORUM	ANAP	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

Tag	Type	VR	Name	Description	PoV	Source
>>(0008,0104)	1	LO	Code Meaning	See NEMA PS3.3 Section 8.3.	ANAP	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.	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. Value = Routine diagnostics measurement	ALWAYS	AUTO

Table 8-29 Lensometry Measurements IOD - Module "Lensometry 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: LEN See NEMA PS3.3 Section C.7.3.1.1.1 for further explanation. Value = LEN	ALWAYS	AUTO

Table 8-30 Lensometry Measurements IOD - 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	AUTO
(0008,1090)	1	LO	Manufacturer's Model Name	Manufacturer’s model name of the equipment that produced the composite instances.	ALWAYS	ACQUISITION
(0018,1000)	1	LO	Device Serial Number	Manufacturer’s serial number of the equipment that produced the composite instances.	ALWAYS	ACQUISITION
(0018,1020)	1	LO	Software Version(s)	Manufacturer’s designation of software version of the equipment that produced the composite instances. • FORUM Driver Version: 2.4.0.0 and higher versions of 2.x.y.z. • CZM NIM, 2.8.0 and higher versions of 2.x.y. • XML Schema Version connectivity interface 1.1.7 and higher versions of 1.x.y. • Firmware version installed on VISUSCREEN	ALWAYS	AUTO

Table 8-31 Lensometry Measurements IOD - 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
(0020,4000)	3	LT	Image Comments	User-defined comments about this SOP Instance.	ALWAYS	AUTO

Table 8-32 Lensometry Measurements IOD - Module "Lensometry Measurements"

Tag	Type	VR	Name	Description	PoV	Source
(0046,0014)	1C	SQ	Right Lens Sequence	A sequence that specifies measurements of a patient's right lens. Required if the right lens is measured. Only a single Item shall be included in this sequence.	ANAP	ACQUISITION
>(0046,0146)	1	FD	Sphere Power	Refractive power of the lens that is the same in all meridians, measured at distance (optical infinity), in diopters.	ANAP	ACQUISITION
>(0046,0018)	1C	SQ	Cylinder Sequence	A sequence that specifies lens measurements to correct for astigmatism or measurements of an eye that has astigmatism. Required if astigmatic correction or astigmatism is measured. Only a single item shall be included in this sequence. Note: When astigmatism is present the power is NOT the same in all meridians, but has its minimum and maximum power in meridians separated by 90 degrees.	ANAP	ACQUISITION
>>(0046,0147)	1	FD	Cylinder Power	The power that is present at the power meridian (90 degrees from the axis), in diopters.	ANAP	ACQUISITION
>>(0022,0009)	1	FL	Cylinder Axis	The meridian, defined in degrees, that is 90 degrees from the power meridian.	ANAP	ACQUISITION
>(0046,0100)	1C	SQ	Add Near Sequence	A sequence that specifies refractive measurements of the lens to correct for inability to focus at near while wearing the distance prescription. Only a single item shall be included in this sequence. Required if Add Near is measured in the lens.	ANAP	ACQUISITION
>>(0046,0104)	1	FD	Add Power	Additional power relative to the distance correction, expressed in diopters, that allows best corrected visual acuity at the defined viewing distance.	ANAP	ACQUISITION
>(0046,0101)	1C	SQ	Add Intermediate Sequence	A sequence that specifies refractive measurements of the lens to correct for inability to focus at intermediate distance while wearing the distance prescription. Only a single item shall be included in this sequence. Required if Add intermediate is measured in the lens.	ANAP	ACQUISITION
>>(0046,0104)	1	FD	Add Power	Additional power relative to the distance correction, expressed in diopters, that allows best corrected visual acuity at the defined viewing distance.	ANAP	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>(0046,0028)	1C	SQ	Prism Sequence	A sequence that specifies prism that is measured in a lens, or that is required to correct for a patient's ocular misalignment. Required if prism is measured in the lens or if this part of a refraction is done for a patient. Only a single item shall be included in this sequence. Note: A prism is a wedge shaped lens that deviates light toward the base and shifts the apparent image toward its apex.	ANAP	ACQUISITION
>>(0046,0030)	1	FD	Horizontal Prism Power	The power of a prism to bend light in the horizontal direction, in prism diopters.	ANAP	ACQUISITION
>>(0046,0032)	1	CS	Horizontal Prism Base	Direction of the base of the measured prism -- either in (toward the nose), or out (away from the nose) Enumerated Value: IN OUT	ANAP	ACQUISITION
>>(0046,0034)	1	FD	Vertical Prism Power	The power of a prism to bend light in the vertical direction, in prism diopters.	ANAP	ACQUISITION
>>(0046,0036)	1	CS	Vertical Prism Base	Direction of the base of the measured prism -- either up, or down. Enumerated Value: UP DOWN	ANAP	ACQUISITION
(0046,0015)	1C	SQ	Left Lens Sequence	A sequence that specifies measurements of a patient's left lens. Required if the left lens is measured. Only a single Item shall be included in this sequence.	ANAP	ACQUISITION
>(0046,0146)	1	FD	Sphere Power	Refractive power of the lens that is the same in all meridians, measured at distance (optical infinity), in diopters.	ANAP	ACQUISITION
>(0046,0018)	1C	SQ	Cylinder Sequence	A sequence that specifies lens measurements to correct for astigmatism or measurements of an eye that has astigmatism. Required if astigmatic correction or astigmatism is measured. Only a single item shall be included in this sequence. Note: When astigmatism is present the power is NOT the same in all meridians, but has its minimum and maximum power in meridians separated by 90 degrees.	ANAP	ACQUISITION
>>(0046,0147)	1	FD	Cylinder Power	The power that is present at the power meridian (90 degrees from the axis), in diopters.	ANAP	ACQUISITION
>>(0022,0009)	1	FL	Cylinder Axis	The meridian, defined in degrees, that is 90 degrees from the power meridian.	ANAP	ACQUISITION
>(0046,0100)	1C	SQ	Add Near Sequence	A sequence that specifies refractive measurements of the lens to correct for inability to focus at near while wearing the distance prescription. Only a single item shall be included in this sequence. Required if Add Near is measured in the lens.	ANAP	ACQUISITION
>>(0046,0104)	1	FD	Add Power	Additional power relative to the distance correction, expressed in diopters, that allows best corrected visual acuity at the defined viewing distance.	ANAP	ACQUISITION

Tag	Type	VR	Name	Description	PoV	Source
>(0046,0101)	1C	SQ	Add Intermediate Sequence	A sequence that specifies refractive measurements of the lens to correct for inability to focus at intermediate distance while wearing the distance prescription. Only a single item shall be included in this sequence. Required if Add intermediate is measured in the lens.	ANAP	ACQUISITION
>>(0046,0104)	1	FD	Add Power	Additional power relative to the distance correction, expressed in diopters, that allows best corrected visual acuity at the defined viewing distance.	ANAP	ACQUISITION
>(0046,0028)	1C	SQ	Prism Sequence	A sequence that specifies prism that is measured in a lens, or that is required to correct for a patient's ocular misalignment. Required if prism is measured in the lens or if this part of a refraction is done for a patient. Only a single item shall be included in this sequence. Note: A prism is a wedge shaped lens that deviates light toward the base and shifts the apparent image toward its apex.	ANAP	ACQUISITION
>>(0046,0030)	1	FD	Horizontal Prism Power	The power of a prism to bend light in the horizontal direction, in prism diopters.	ANAP	ACQUISITION
>>(0046,0032)	1	CS	Horizontal Prism Base	Direction of the base of the measured prism -- either in (toward the nose), or out (away from the nose) Enumerated Value: IN OUT	ANAP	ACQUISITION
>>(0046,0034)	1	FD	Vertical Prism Power	The power of a prism to bend light in the vertical direction, in prism diopters.	ANAP	ACQUISITION
>>(0046,0036)	1	CS	Vertical Prism Base	Direction of the base of the measured prism -- either up, or down. Enumerated Value: UP DOWN	ANAP	ACQUISITION

Table 8-33 Lensometry Measurements IOD - Module "Visulens Lensometry Measurements"

Tag	Type	VR	Name	Description	PoV	Source
(2801,xx00)	3	SQ	Prescription right lens sequence	A sequence that specifies the extended prescription values for the right lens Contains only one single item..	ANAP	ACQUISITION
>(2801, xx02)	3	SQ	UV transmittance sequence	A sequence that specifies the UV transmittance measurements at different wavelengths. The sequence contains four items measured at different wavelengths (365 nm, 375 nm, 395 nm and 405 nm)	ANAP	ACQUISITION
>>(2801, xx03)	1	FD	UV transmittance wave length	Wavelength in nm the UV transmittance is measured at.	ANAP	ACQUISITION

>>(2801, xx04))	1	FD	UV transmittance	UV transmittance in percentage measured at the specified wavelength.	ANAP	ACQUISITION
(2801, xx01)	3	SQ	Prescription left lens sequence	A sequence that specifies the extended prescription values for the left lens Contains only one single item.	ANAP	ACQUISITION
>(2801, xx02)	3	SQ	UV transmittance sequence	A sequence that specifies the UV transmittance measurements at different wavelengths. The sequence contains four items measured at different wavelengths (365 nm, 375 nm, 395 nm and 405 nm)	ANAP	ACQUISITION
>>(2801, xx03)	1	FD	UV transmittance wave length	Wavelength in nm the UV transmittance is measured at.	ANAP	ACQUISITION
>>(2801, xx04)	1	FD	UV transmittance	UV transmittance in percentage measured at the specified wavelength.	ANAP	ACQUISITION

Table 8-34 Lensometry 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 C.12.1.1.1 for further explanation. See also PS 3.4. Value = 1.2.840.10008.5.1.4.1.1.78.2	ALWAYS	CONFIG
(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
(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 C.12.1.1.2 for Defined Terms.	ALWAYS	AUTO
(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

Tag	Type	VR	Name	Description	PoV	Source
(0008,0201)	3	SH	Timezone Offset From UTC	Contains the offset from UTC to the timezone for all DA and TM Attributes present in this SOP Instance, and for all DT Attributes present in this SOP Instance that do not contain an explicitly encoded timezone offset. Encoded as an ASCII string in the format "&ZZXX". The components of this string, from left to right, are & = "+" or "-", and ZZ = Hours and XX = Minutes of offset. Leading space characters shall not be present. The offset for UTC shall be +0000; -0000 shall not be used. Notes: 1. This encoding is the same as described in PS 3.5 for the offset component of the DT Value Representation. 2. This Attribute does not apply to values with a DT Value Representation, that contains an explicitly encoded timezone offset. 3. The corrected time may cross a 24 hour boundary. For example, if Local Time = 1.00 a.m. and Offset = +0200, then UTC = 11.00 p.m. (23.00) the day before. 4. The "+" sign may not be omitted. Time earlier than UTC is expressed as a negative offset. Note: For example: UTC = 5.00 a.m. Local Time = 3.00 a.m. Offset = -0200 The local timezone offset is undefined if this Attribute is absent.	ALWAYS	AUTO

8.1.2 Usage of Attributes from Received IOD's

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

The case of patient data collision is outlined in chapter of Study Root Query/Retrieve SOP Class.

8.1.3 Attribute Mapping

In scheduled case, the following attributes are mapped from Modality Worklist to instances of Encapsulated PDF IOD, Ophthalmic Tomography IOD, Ophthalmic Photography IOD, Multi-frame True Color Secondary Capture IOD and Raw Data IOD.

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
(0010,4000)	Patient Comments	(0010,4000)	Patient Comments	No
(0008,0050)	Accession Number	(0008,0050)	Accession Number	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
		(0018,1030)	Protocol Name	No
		(0040,0254)	Performed Procedure Step 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

Modality Worklist		Instance IOD		Editable
>(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
(0008,1110)	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			No
>(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 VISUSCREEN Application Software.

8.2 Data Dictionary of Private Attributes

Group ID: 2801
Private Creator String: “99CZM_VISULENS_LensometryMeasurements”
Occurs in: Lensometry Measurements SOP Instance

Attribute Name	Element ID	VR	VM
Prescription Right Lens Sequence	00	SQ	1
Prescription Left Lens Sequence	01	SQ	1
UV transmittance Sequence	02	SQ	1
UV transmittance wavelength	03	FD	1
UV transmittance	04	FD	1

Group ID: 2701
Private Creator String: “99CZM_VISUPHOR_VisualAcuityMeasurements”
Occurs in: Subjective Refraction Measurements SOP Instance

Attribute Name	Element ID	VR	VM
Visual Acuity Distance Sequence	00	SQ	1
Visual Acuity Right Eye Sequence	04	SQ	1
Visual Acuity Left Eye Sequence	05	SQ	1
Visual Acuity Both Eyes Open Sequence	06	SQ	1
Decimal Visual Acuity	07	FD	1
Visual Acuity Modifiers	08	SS	1

8.3 Coded Terminology and Templates

Not applicable.

8.4 Greyscale Image Consistency

Not applicable.

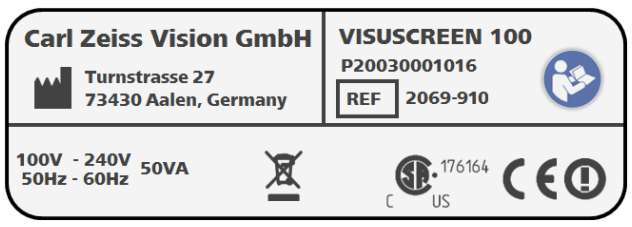
8.5 Standard Extended / Specialized/ Private SOP Classes

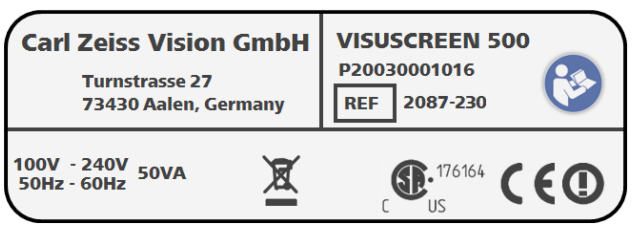
Table 8-33 Lensometry Measurements IOD - Module "Visulens Lensometry Measurements"
Table 8-8 Subjective Refraction Measurements IOD - Module " Visuphor Visual Acuity Measurements"

8.6 Private Transfer Syntaxes

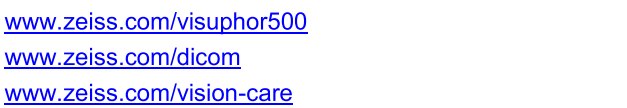
No Private Transfer Syntax is supported.

The product meets the essential requirements stipulated in Annex I of the 93/42/EEC Directive governing medical devices. The product is labeled with::





	Manufacturer's symbol
REF	Reference number
P20030001016	Project classification
	Read the instructions for use
CE	EU conformity mark
	Class 2 radio system
	CSA (Canadian Standards Association)
	Wheelie bin with "X" through it
S/N	Serial number



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