



GE Medical Systems

Kretz Ultrasound

DICOM Conformance Statement

105853

Revision 0

VOLUSON[®] 730Expert/Pro

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Voluson 730Expert/Pro DICOM Conformance Statement

GEMS Kretz Ultrasound

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Table of Contents

| | |
|---|----|
| 0 Introduction | 5 |
| 0.1 DICOM Background | 5 |
| 1 Implementation Model | 6 |
| 1.1 Application Data Flow Diagram..... | 6 |
| 1.2 Functional Definitions of AE's..... | 7 |
| 1.3 Sequencing of Real-world Activities | 7 |
| 2 AE Specifications | 8 |
| 2.1 Printing AE - Specification..... | 8 |
| Association Establishment Policies | 8 |
| 2.1.1.1 General | 8 |
| 2.1.1.2 Asynchronous Nature | 8 |
| 2.1.1.3 Implementation Identifying Information | 8 |
| Association Initiation by Real-world Activity..... | 8 |
| 2.1.1.4 Association Initiation by: "Print" in SonoView | 8 |
| Association Establishment Policies | 14 |
| 2.1.1.5 General | 14 |
| 2.1.1.6 Number of Associations | 14 |
| 2.1.1.7 Asynchronous Nature | 14 |
| 2.1.1.8 Implementation Identifying Information | 14 |
| Association Initiation by Real-world Activity..... | 14 |
| 2.1.1.9 Association Initiation by: "Send" in SonoView or by Direct Send | 14 |
| 2.2 Worklist AE - Specification..... | 21 |
| Association Establishment Policies | 21 |
| 2.2.1.1 General | 21 |
| 2.2.1.2 Number of Associations | 21 |
| 2.2.1.3 Asynchronous Nature | 21 |
| 2.2.1.4 Implementation Identifying Information | 22 |
| Association Initiation by Real-world Activity..... | 22 |
| 2.2.1.5 Association Initiation by: "Search" | 22 |
| 3 Communication Profiles | 23 |
| 3.1 TCP/IP Stack Supported | 23 |
| Physical Media Supported | 23 |
| 4 Extensions/Specializations/Privatizations..... | 24 |
| 4.1 Standard Extended/Specialized/Private SOPs | 24 |
| 4.2 Private Transfer Syntaxes | 24 |
| 5 Configuration..... | 24 |
| 5.1 AE Title/Presentation Address Mapping | 24 |
| 5.2 Configurable Parameters..... | 24 |
| 6 Support of Extended Character Sets | 24 |
| Voluson 730Expert/Pro DICOM Conformance Statement | 3 |
| 105853 Rev. 0 | |

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0 Introduction

This document describes the Kretztechnik Voluson 730 Ultrasound System's conformance to the ACR-NEMA DICOM (Digital Imaging and Communications in Medicine) standard and satisfies the DICOM requirement for a vendor conformance specification.

The Voluson 730 system is an ultrasound imaging device. The SonoView option of the Voluson 730 system provides a means to select images and send them via DICOM to storage servers and printers.

0.1 DICOM Background

The DICOM information exchange specification provides a definitive structure of commands and information that allow for the intercommunication of medical imaging devices. Developed by the American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA), the DICOM standard strives to promote communication of image information through the use of a standardized set of command classes and information semantics.

The DICOM standard defines classes of information that are common to many modalities of medical imaging. However, to meet the specific needs of information content for such a diverse range of information, the DICOM specification defines structures for a multitude of medical data. To alleviate the need for applications to implement every aspect of the DICOM specification, a list of conformance tables for every modality was created to define the minimum set of information necessary for data exchanges. A requirement of the DICOM specification is to maintain a compliance document that outlines a subset of DICOM services and data classes that are supported by an application. The purpose of this document is to define a subset of DICOM for the exchange of information with the Kretztechnik Voluson 730 via its SonoView feature.

This document is written with respect to the ACR-NEMA Digital Imaging and Communications in Medicine (DICOM) version number 3.0. For complete definitions of terms and acronyms in this document, please refer to the Digital Imaging and Communications in Medicine (DICOM) Standard.

1 Implementation Model

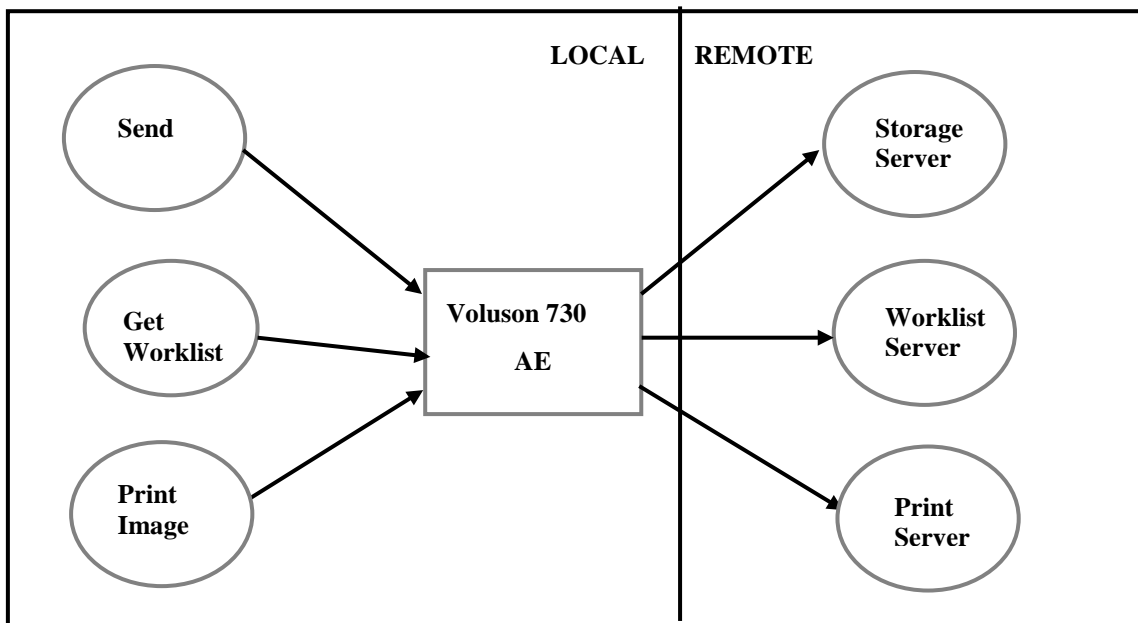
The Voluson 730 SonoView feature incorporates the DICOM 3.0 standard for networked image printing and image store functions. Images are transferred from the Voluson 730 ultrasound system using standard network connections to be processed on a centralized printer or stored on a DICOM compliant file server.

1.1 Application Data Flow Diagram

The diagram below represents the SonoView's Application Entities (AE) (in the boxes) and depicts the relationship of the Application Entity's use of DICOM to invoke real-world activities (shown on the right side).

There are two local real-world activities that occur in the Voluson 730 system – Image Send and Image Print. When a user changes operation mode to image filing system from a live scanning session, the system will provide the menu to send images to a network archiving server or print images to a DICOM compliant printer.

Figure 1.1-1 Implementation Model



1.2 Functional Definitions of AE's

Printing AE

This AE handles all aspects of the Print Management SCU.

Storing AE

This AE handles sending ultrasound images to a storage server using the DICOM Store SCU Services. In addition, screen capture images of reporting data can be sent using Secondary Capture SOP class.

Worklist AE

This AE supports the DICOM Basic Worklist Management Service as an SCU.

1.3 Sequencing of Real-world Activities

In order for any of the remote processes to be able to provide the Real World Activity SCP services which the Voluson 730 system, an SCU, has requested, the appropriate association must have been previously opened. This initiation occurs with the "Send" command in SonoView image store operations or "Print" in SonoView for image print operations. In addition Send and Print requests can also be queued (using 'Direct Send' and 'Direct Print') . In this case the queue manager will open an association and transfer the images in the background.

There are no other sequencing requirements.

2 AE Specifications

2.1 Printing AE - Specification

The Printing AE provides conformance to the following DICOM SOP Classes as an SCU:

| SOP Class Name | SOP Class UID | Conformance Level |
|---|-------------------------|-------------------|
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9 | Standard |
| Basic Color Print Management Meta SOP Class | 1.2.840.10008.5.1.1.18 | Standard |
| Basic Film Session SOP Class | 1.2.840.10008.5.1.1.1 | Standard |
| Basic Film Box SOP Class | 1.2.840.10008.5.1.1.2 | Standard |
| Basic Gray Image Box SOP Class | 1.2.840.10008.5.1.1.4 | Standard |
| Basic Color Image Box SOP Class | 1.2.840.10008.5.1.1.4.1 | Standard |
| Printer SOP Class | 1.2.840.10008.5.1.1.16 | Standard |

Association Establishment Policies

The Printing AE will initiate an association when the user invokes the “Print” command in SonoView.

2.1.1.1 General

Maximum PDU size offered: 28,672 bytes

Minimum PDU size accepted: 1,024 bytes

Number of Associations

The maximum number of simultaneous associations for the Printing AE is 2.

2.1.1.2 Asynchronous Nature

The Printing AE will not use asynchronous operations window negotiation.

2.1.1.3 Implementation Identifying Information

Implementation Class UID: “1.2.276.0.26.20010718.240”

Implementation Version name: “KRETZDICOM_240”

Notes: Version name above will be used initially but is subject to change with versions.

Association Initiation by Real-world Activity

The Printing AE will open associations to the Print Server when the real-world activity occurs corresponding to the user invocation of “Print” command in SonoView. All images in the selected exams from SonoView will be sent to the Print Server. After all images are printed, the association will be closed.

2.1.1.4 Association Initiation by: “Print” in SonoView

The user invocation of “Print” in SonoView will cause an association to be initiated to Print Server.

2.1.1.4.1 Proposed Presentation Context to a Gray Print Server

Printing AE Proposed Presentation Contexts to a Gray Print Server

| Presentation Context Table | | | | | |
|--|-----------------------|---|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Basic Gray Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9 | DICOM Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 | SCU | None |

2.1.1.4.1.1 SOP Specific Conformance to Verification SOP Class

The Printing AE does not use the Verification SOP Class as an SCU.

2.1.1.4.1.2 SOP Specific Conformance to Basic Gray Print Management Meta SOP Class

The Printing AE provides Standard Conformance to the Basic Gray Print Management Meta SOP Class as an SCU. This implies standard conformance for the

- Basic Film Session SOP Class,
- Basic Film Box SOP Class,
- Basic Grayscale Image Box SOP Class,
- Printer SOP Class.

Each of these SOP classes is described in the paragraphs to follow.

2.1.1.4.1.2.1 SOP Specific Conformance to Basic Film Session SOP Class

DICOM specified usage: M = mandatory, U = User option

Supported DIMSE Services

| Name | Usage | Description |
|----------|-------|--------------------------|
| N-Create | M | Creates the film session |
| N-Set | U | Not used |
| N-Delete | U | Deletes the film session |
| N-Action | U | Not used |

Supported SOP Class Elements

| Name | Usage | Range | Description |
|--------------------|-------|------------------------------|---|
| Number of Copies | U | 1 to 99 | Number of requested copies of film |
| Print Priority | U | HIGH, MED, LOW | Used |
| Medium Type | U | PAPER, CLEAR FILM, BLUE FILM | Range may be further restricted by printer. |
| Film Destination | U | MAGAZINE, PROCESSOR | Range may be further restricted by printer. |
| Film Session Label | U | -- | Not used |
| Memory Allocation | U | -- | Not used |

2.1.1.4.1.2.2 SOP Specific Conformance to Basic Film Box SOP Class

Supported DIMSE Services

| Name | Usage | Description |
|----------|-------|--|
| N-Create | M | Creates the film box. |
| N-Set | U | Not used |
| N-Delete | U | Deletes the film box. Used after each film is printed. |
| N-Action | M | PRINT - Sent after each filling of a film box and also at the end of the exam if one or more images have been transferred into the film box. |

Supported SOP Class Elements

| Name | Usage | Range | Description |
|----------------------------------|-------|---|---|
| Image Display Format | M | Standard \1,1 Standard \1,2 Standard \2,2 Standard \2,3 Standard \3,3 Standard \3,4 Standard \3,5 Standard \4,4 Standard \4,5 Standard \4,6 | Range may be further restricted by printer. |
| Referenced Film Session Sequence | M | | Used |
| Referenced SOP Class UID | M | 1.2.840.10008.5.1.1.1 | Film Session SOP Class UID |
| Referenced SOP Instance UID | M | | Referenced Film Session SOP |
| Film Orientation | U | Portrait Landscape | Range may be further restricted by printer. |
| Film Size ID | U | 8 in X 10 in 24 cm X 24 cm 10 in X 12 in 24 cm X 30 cm 10 in X 14 in 11 in X 14 in 14 in X 14 in 14 in X 17 in | Range may be further restricted by printer. |
| Magnification Type | U | REPLICATE, BILINEAR, CUBIC, NONE | Used |
| Max Density | U | Limited by printer | Used |
| Configuration Information | U | | Used |
| Annotation Display Format Id | U | | Not used |
| Smoothing Type | U | | Not used |
| Border Density | U | Black, White | Used |
| Empty Image Density | U | Black, White | Used |
| Min Density | U | Limited by printer | Used |
| Trim | U | | Not used |

2.1.1.4.1.2.3 SOP Specific Conformance to Basic Grayscale Image Box SOP Class

Supported DIMSE Services

| Name | Usage | Description |
|-------|-------|--|
| N-Set | M | An image box instance is created by the SCP for each potential image of the film box. Only the instances that will actually contain images will be updated with the N_SET message. |

Supported SOP Class Elements

| Name | Usage | Range | Description |
|--|-------|----------------------------------|------------------------|
| Image Position | M | 1-n | Used |
| Pre-formatted Grayscale Image Sequence | M | | Used |
| Samples/pixel | M | 1 | Used |
| Photometric Interpretation | M | MONOCHROME2 | 0 = Black, 255 = White |
| Rows | M | 600 | Pixels |
| Columns | M | 800 | Pixels |
| Pixel Aspect Ratio | M | | Not used |
| Bits Allocated | M | 8 | 8 bits per sample |
| Bits Stored | M | 8 | Used |
| High bit | M | 7 | Bit 7 is MSB |
| Pixel Representation | M | 0 | Unsigned pixel values |
| Pixel Data | M | | Gray pixel data |
| Polarity | U | | Not used |
| Referenced Overlay Sequence | U | | Not used |
| >SOP Class UID | U | | Not used |
| >SOP Instance UID | U | | Not used |
| Magnification Type | U | Replicate, Bilinear, Cubic, None | Used |
| Smoothing Type | U | | Not used |
| Requested Image Size | U | | Not used |

2.1.1.4.1.2.4 SOP Specific Conformance to Printer SOP Class

Supported DIMSE Services

| Name | Usage | Description |
|----------------|-------|---|
| N-Event-Report | M | Handled but always ignored. Asynchronous input from the printer to this AE used to report changes in printer status. It may be received any time after association establishment and before association release or abort. |
| N-Get | U | May be issued by this device at any time to get printer status. The Attribute Identifier List will always be empty indicating that all attributes are to be returned. |

Supported SOP Class Elements

Note: These attributes are not set by this device. The attribute description here indicates which attributes are used by this device when they are returned by the printer.

| Name | Usage | Range | Description |
|-------------------|-------|------------------------------|---|
| Printer Status | U | NORMAL WARNING FAILURE | Warning and Failure are reported to user. |
| Print Status Info | U | | Reported to user. |
| Printer Name | U | | Ignored |
| Manufacturer | U | | Ignored |
| Model Name | U | | Not used |
| Serial Number | U | | Not used |
| Software Version | U | | Not used |
| Calibration Date | U | | Not used |
| Calibration Time | U | | Not used |

2.1.1.4.2 Proposed Presentation Context to a Color Print Server

Printing AE Proposed Presentation Contexts to a Color Print Server

| Presentation Context Table | | | | | |
|---|------------------------|---|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Basic Color Print Management Meta SOP Class | 1.2.840.10008.5.1.1.18 | DICOM Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 | SCU | None |

2.1.1.4.2.1 SOP Specific Conformance to Verification SOP Class

The Printing AE does not use the Verification SOP Class as an SCU.

2.1.1.4.2.2 SOP Specific Conformance to Basic Color Print Management Meta SOP Class

The Printing AE provides Standard Conformance to the Basic Color Print Management Meta SOP Class as an SCU. This implies standard conformance for the following SOP classes:

Basic Film Session SOP Class

Basic Film Box SOP Class

Basic Color Image Box SOP Class

Printer SOP Class

Similarly, the Basic Grayscale Print Management Met SOP Class uses:

Basic Film Session SOP Class

Basic Film Box SOP Class

Basic Grayscale Image Box SOP Class

Printer SOP Class

The SOP classes are described in the sections to follow.

2.1.1.4.2.3 SOP Specific Conformance to Basic Color Image Box SOP Class

Supported DIMSE Services

| Name | Usage | Description |
|-------|-------|---|
| N-Set | M | An image box instance is created by the SCP for each potential image of the film box. Only the instances which will actually contain images will be updated with the N_SET message. |

Supported SOP Class Elements

| Name | Usage | Range | Description |
|------------------------------------|-------|----------------------------------|---|
| Image Position | M | 1-n | Used |
| Pre-formatted Color Image Sequence | M | | Used |
| Samples/pixel | M | 3 | Used |
| Photometric Interpretation | M | RGB | Used |
| Planar Configuration | | 1 | Planar - red plane first, then green, and blue. |
| Rows | M | 600 | Pixels |
| Columns | M | 800 | Pixels |
| Pixel Aspect Ratio | M | | Not used |
| Bits Allocated | M | 8 | 8 bits per sample |
| Bits Stored | M | 8 | Used |
| High bit | M | 7 | Bit 7 is MSB |
| Pixel Representation | M | 0 | Unsigned pixel values |
| Pixel Data | M | | Color pixel planes data |
| Polarity | U | | Not used |
| Referenced Overlay Sequence | U | | Not used |
| >SOP Class UID | U | | Not used |
| >SOP Instance UID | U | | Not used |
| Magnification Type | U | Replicate, Bilinear, Cubic, None | Used |
| Smoothing Type | U | | Not used |
| Requested Image Size | U | | Not used |

Storing AE - Specification

The Storing AE provides conformance to the following DICOM SOP Classes as an SCU:

| SOP Class Name | SOP Class UID | Conformance Level |
|--------------------------------------|-----------------------------|-------------------|
| Ultrasound Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.6.1 | Standard Extended |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | Standard Extended |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | Standard Extended |

Association Establishment Policies

The Storing AE will open an association when the user invokes the “Send” command.

2.1.1.5 General

Maximum PDU size offered: 28,672 bytes

Minimum PDU size accepted: 1,024 bytes

2.1.1.6 Number of Associations

The maximum number of simultaneous associations for the Storing AE is 4.

Note that the other Application Entities in this device may also be simultaneous active.

2.1.1.7 Asynchronous Nature

The Storing AE will not use asynchronous operations window negotiation.

2.1.1.8 Implementation Identifying Information

Implementation Class UID: "1.2.276.0.26.20010718.240"

Implementation Version name: " KRETZDICOM_240"

Notes: “ Version name above will be used initially but is subject to change with versions.

Association Initiation by Real-world Activity

The Storing AE will open associations to the Storage Server when the real-world activity occurs corresponding to the user invocation of “Send” command in SonoView. All images in Selected exams from SonoView will be sent to the Storage Server. After all images are transferred, the association will be closed.

In ‘Direct Send’ mode the Storing AE will queue the current image for transfer. The queue manager will then open an association to the Storage Server and send the images in background.

2.1.1.9 Association Initiation by: “Send” in SonoView or by Direct Send

The user invocation of “Send” in SonoView will cause an association to be initiated.

If there are queued 'Direct Send' transfers pending an association will be initiated as well. In this case the transfers will be done in the background.

2.1.1.9.1 Proposed Presentation Context to a Storage Server

Storing AE Proposed Presentation Contexts to a Storage Server

| Presentation Context Table | | | | | |
|------------------------------|-----------------------------|---------------------------|------------------------|---------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Ultrasound Image | 1.2.840.10008.5.1.4.1.1.6.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SC U | None |
| Multi Frame Ultrasound Image | 1.2.840.10008.5.1.4.1.1.3.1 | JPEG Baseline | 1.2.840.10008.1.2.4.50 | SC U | None |
| Secondary Capture | 1.2.840.10008.5.1.4.1.1.7 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SC U | None |

2.1.1.9.1.1 SOP Specific Conformance to Verification SOP Class

The Storing AE does not use the Verification SOP Class as an SCU.

2.1.1.9.1.2 SOP Specific Conformance Statement to the Ultrasound , the US Multiframe and the Secondary Capture Storage SOP Class.

The Ultrasound Image Storage SOP uses the Ultrasound Image IOD Modules as follows:

Ultrasound Image Storage Modules Used

| Module | Usage | Description |
|-----------------------|-------|--|
| Patient | M | Used |
| General Study | M | Used |
| Patient Study | U | Used |
| General Series | M | Used |
| Frame of Reference | U | Not used |
| US Frame of Reference | C | Not used |
| General Equipment | M | Used |
| General Image | M | Used |
| Image Pixel | M | Used |
| Contrast/bolus | C | Not used |
| US Region Calibration | U | Used |
| US Image | M | Used |
| Overlay Plane | U | Not used |
| VOI LUT | U | Not used |
| SOP Common | M | Used |
| Curve Identification | M | Not used since the Curve IE is mutually exclusive with the Image IE. |
| Curve | M | Not used since the Curve IE is mutually exclusive with the Image IE. |
| Audio | U | Not used since the Curve IE is mutually exclusive with the Image IE. |
| Curve SOP Common | M | Not used since the Curve IE is mutually exclusive with the Image IE. |

The Ultrasound Multi Frame Image Storage SOP uses the Ultrasound Multi Frame Image IOD Modules as follows:

Ultrasound Multi Frame Image Storage Modules Used

| Module | Usage | Description |
|---------------|-------|-------------|
| Patient | M | Used |
| General Study | M | Used |
| Patient Study | U | Used |

| | | |
|-----------------------|---|--|
| General Series | M | Used |
| Frame of Reference | U | Not used |
| US Frame of Reference | C | Not used |
| General Equipment | M | Used |
| General Image | M | Used |
| Image Pixel | M | Used |
| Contrast/bolus | C | Not used |
| Cine | M | Used |
| Multi-Frame | M | Used |
| Palette Color LUT | C | Not used |
| US Region Calibration | U | Not used |
| US Image | M | Used |
| VOI LUT | U | Not used |
| SOP Common | M | Used |
| Curve Identification | M | Not used since the Curve IE is mutually exclusive with the Image IE. |
| Curve | M | Not used since the Curve IE is mutually exclusive with the Image IE. |
| Audio | U | Not used since the Curve IE is mutually exclusive with the Image IE. |
| Curve SOP Common | M | Not used since the Curve IE is mutually exclusive with the Image IE. |

The Secondary Capture Storage SOP uses the SC Image IOD Modules as follows:

Secondary Capture Storage Modules Used

| Module | Usage | Description |
|-------------------|-------|-------------|
| Patient | M | Used |
| General Study | M | Used |
| Patient Study | U | Used |
| General Series | M | Used |
| General Equipment | M | Used |
| SC Equipment | M | Used |
| General Image | M | Used |
| Image Pixel | M | Used |
| SC Image | M | Used |
| Overlay Plane | U | Not used |
| Modality LUT | U | Not used |
| VOI LUT | U | Not used |
| SOP Common | M | Used |

Each module which is used by the Storing AE has a table below which indicates the elements supported.

Patient Module Elements

| Name | Use | Tag | Range | Description |
|-----------------------------|-----|------------|-------|--------------------------------|
| Patient's Name | 2 | 0010, 0010 | xx | Patient name with ^ delimiters |
| Patient ID | 2 | 0010, 0020 | xx | 64 char max |
| Birth Date | 2 | 0010, 0030 | xx | Used |
| Patient Sex | 2 | 0010, 0040 | xx | Used |
| Referenced Patient Sequence | 3 | | | Not used |
| Patient's Birth Time | 3 | | | Not used |
| Other Patient ID | 3 | | | Not used |
| Other Patient Names | 3 | | | Not used |
| Ethnic Group | 3 | | | Not used |
| Patient Comments | 3 | | | Not used |

General Study Module Elements

| Name | Use | Tag | Range | Description |
|------------------------------|-----|------------|----------|-------------|
| Study Instance UID | 1 | 0020, 000D | xx | Used |
| Study Date | 2 | 0008, 0020 | yyyymmdd | Exam date |
| Study Time | 2 | 0008, 0030 | hhmmss | Exam time |
| Referring Physician Name | 2 | 0008, 0090 | | Used |
| Study ID | 2 | 0020, 0010 | xx | Zero Length |
| Accession Number | 2 | 0008, 0050 | xx | Used |
| Study Description | 3 | | | Not used |
| Name of Reading Physician(s) | 3 | 0008,1060 | | Used |
| Referenced Study Sequence | 3 | | | Not used |

General Series Module Elements

| Name | Use | Tag | Range | Description |
|---------------------------------|-----|------------|----------|---------------------------|
| Modality | 1 | 0008, 0060 | US | Always US for ultrasound. |
| Series Instance UID | 1 | 0020, 000E | xx | Used |
| Series Number | 2 | 0020, 0011 | xx | Series number in exam |
| Laterality | 2C | 0020, 0060 | | Not used |
| Series Date | 3 | 0008, 0021 | yyyymmdd | Used |
| Series Time | 3 | 0008, 0031 | hhmmss | Used |
| Performing Physician's Name | 3 | 0008, 1050 | | Not used |
| Protocol Name | 3 | 0018, 1030 | | Not used |
| Series Description | 3 | 0008,103E | | Not used |
| Operator's Name | 3 | 0008, 1070 | | Used |
| Referenced Study Component Seq. | 3 | 0008, 1111 | | Not used |
| Body Part Examined | 3 | 0018, 0015 | | Not used |
| Patient Position | 2C | 0018, 5100 | | Not used |
| Smallest Pixel Value in Series | 3 | 0028, 0108 | | Not used |
| Largest Pixel Value in Series | 3 | 0028, 0109 | | Not used |

General Equipment Module Elements

| Name | Use | Tag | Range | Description |
|-------------------------------|-----|------------|----------------|-------------|
| Manufacturer | 2 | 0008, 0070 | Kretztechnik | Used |
| Institution Name | 3 | 0008,0080 | | Used |
| Institution Address | 3 | | | Not used |
| Station Name | 3 | 0008,1010 | | Used |
| Institutional Department Name | 3 | | | Not used |
| Manufacturer's Model Name | 3 | 0008, 1090 | VOLUSON 730 | Used |
| Device Serial Number | 3 | 0018,1000 | 0 | Used |
| Software Version | 3 | | | Not used |
| Spatial Resolution | 3 | | | Not used |
| Date of Last Calibration | 3 | | | Not used |
| Time of Last Calibration | 3 | | | Not used |
| Pixel Padding Value | 3 | | | Not used |

Secondary Capture Equipment Module Elements

| Name | Use | Tag | Range | Description |
|--|-----|------------|-------|-------------|
| Conversion Type | 1 | 0008,0064 | WSD | Used |
| Modality | 3 | 0008,0060 | US | Used |
| Secondary Capture Device ID | 3 | 0018,1010 | | Not used |
| Secondary Capture Device Manufacturer | 3 | 0008,1016 | | Not used |
| Institutional Department Name | 3 | | | Not used |
| Secondary Capture Device Manufacturer's Model Name | 3 | 0008, 1018 | | Not used |
| Secondary Capture Device Software Version | 3 | 0018,1019 | | Not used |
| Video Image Format Acquired | 3 | 0018,1022 | | Not used |
| Digital Image Format Acquired | 3 | | | Not used |

General Image Module Elements

| Name | Use | Tag | Range | Description |
|---------------------------|-----|-----------|-------|----------------------------|
| Image Number | 2 | 0020,0013 | 1-n | Image number in exam |
| Patient Orientation | 2C | 0020,0020 | | Zero length |
| Image Date | 2C | | | Not used |
| Image Time | 2C | | | Not used |
| Image Type | 3 | 0008,0008 | Xxx | Used |
| Acquisition Number | 3 | | | Not used |
| Acquisition Date | 3 | | | Not used |
| Acquisition Time | 3 | | | Not used |
| Referenced Image Sequence | 3 | | | Not used |
| Derivation Description | 3 | 0028,2111 | | Not used |
| Source Image Sequence | 3 | | | Not used |
| Images in Acquisition | 3 | | | Not used |
| Image Comments | 3 | 0020,4000 | Xxx | Used |
| Lossy Image Compression | 3 | 0028,2110 | 01 | for lossy compressed image |

Image Pixel Module Elements

| Name | Use | Tag | Range | Description |
|----------------------------|-----|------------|-----------------------|---------------------------------------|
| Samples Per Pixel | 1 | 0028, 0002 | 1 or 3 | RGB: 3 MONOCHROME2: 1 |
| Photometric Interpretation | 1 | 0028, 0004 | RGB or MONOCHROME2 | configurable per DICOM destination |
| Rows | 1 | 0028, 0010 | 600 | Used |
| Columns | 1 | 0028, 0011 | 800 | Used |
| Bits Allocated | 1 | 0028, 0100 | 8 | Used |
| Bits Stored | 1 | 0028, 0101 | 8 | Used |
| High Bit | 1 | 0028, 0102 | 7 | Used |
| Pixel Representation | 1 | 0028, 0103 | 0 | Unsigned int |
| Pixel Data | 1 | 7FE0, 0010 | | Used |
| Planar Configuration | 1C | 0028, 0006 | 0 | Used if RGB |
| Aspect Ratio | 1C | 0028, 0034 | | Not used |
| Smallest Image Pixel Value | 3 | 0028, 0106 | | Not used |
| Largest Image Pixel Value | 3 | 0028, 0107 | | Not used |
| Window Center | 3 | 0028, 1050 | 127 | Used if MONOCHROME2 |
| Window Width | 1C | 0028, 1051 | 256 | Used if MONOCHROME2 |

Cine Module Elements

| Name | Use | Tag | Range | Description |
|-------------------------------|-----|-----------|-------|------------------------|
| Preferred Playback Sequencing | 3 | 0018,1244 | | Not used |
| Frame Time | 1C | 0018,1063 | | Set to interframe time |
| Frame Time Vector | 1C | 0018,1065 | | Not Used |
| Start Trim | 3 | 0008,2142 | | Not used |
| Stop Trim | 3 | 0008,2143 | | Not used |
| Rec. Display Frame Rate | 3 | 0008,2144 | | Not used |
| Cine Rate | 3 | 0018,0040 | | Not used |
| Frame Delay | 3 | 0018,1066 | | Not used |
| Effective Duration | 3 | 0018,1072 | | Not used |
| Actual Frame Duration | 3 | 0018,1242 | | Not used |

Multi Frame Module Elements

| Name | Use | Tag | Range | Description |
|-------------------------|-----|-----------|-----------------------------------|-------------|
| Number of Frames | 1 | 0028,0008 | Set to number of frames in image. | Used |
| Frame Increment Pointer | 1 | 0028,0009 | Is set to Frame Time (0018,0063) | Used |

US Image Module Elements

| Name | Use | Tag | Range | Description |
|-----------------------------|-----|------------|--------------------|------------------------------------|
| Photometric Interpretation | 1 | 0028, 0004 | RGB or MONOCHROME2 | configurable per DICOM destination |
| Pixel Representation | 1 | 0028, 0103 | 0 | Unsigned int |
| Frame Increment Pointer | 1C | | | Not used |
| Lossy Image Compression | 1C | 0028, 2110 | 0,1 | for lossy compressed image |
| Number Stages | 2C | | | Not used |
| Number Views in Stage | 2C | | | Not used |
| Referenced Overlay Sequence | 3 | | | Not used |
| Referenced Curve Sequence | 3 | | | Not used |
| Stage Name | 3 | | | Not used |
| Stage Number | 3 | | | Not used |
| View Number | 3 | | | Not used |
| Number of Event Timers | 3 | | | Not used |
| Event Elapsed Times | 3 | | | Not used |
| Event Timer Name | 3 | | | Not used |
| Transducer Position | 3 | | | Not used |
| Transducer Orientation | 3 | | | Not used |
| Anatomic Structure | 3 | | | Not used |
| Trigger Time | 3 | | | Not used |
| Nominal Interval | 3 | | | Not used |
| Beat Rejection Flag | 3 | | | Not used |
| Low R-R Value | 3 | | | Not used |
| High R-R Value | 3 | | | Not used |
| Heart Rate | 3 | | | Not used |
| Output Power | 3 | | | Not used |
| Transducer Data | 3 | | | Not used |
| Transducer Type | 3 | | | Not used |
| Focus Depth | 3 | | | Not used |
| Preprocessing Function | 3 | | | Not used |
| Mechanical Index | 3 | | | Not used |

| | | | | |
|-----------------------------------|---|--|--|----------|
| Bone Thermal Index | 3 | | | Not used |
| Cranial Thermal Index | 3 | | | Not used |
| Soft Tissue Thermal Index | 3 | | | Not used |
| Soft Tissue-focus Thermal Index | 3 | | | Not used |
| Soft Tissue-surface Thermal Index | 3 | | | Not used |
| Depth of Scan Field | 3 | | | Not used |
| Image Transformation Matrix | 3 | | | Not used |
| Image Translation Vector | 3 | | | Not used |
| Ultrasound color data present | 3 | | | Not used |

Remarks: Internally the V730 stores all images as RGB. Whenever a destination is configured for MONOCHROME2 the images are converted on the fly and then transmitted. In this case the SOP instance UID of the transmitted DICOM object is changed.

Secondary Capture Image Module Elements

| Name | Use | Tag | Range | Description |
|---------------------------|-----|------------|-------|-------------|
| Date of Secondary Capture | 3 | 0018, 1012 | | Not used |
| Time of Secondary Capture | 3 | 0018, 1014 | | Not used |

US Region Calibration Module elements

| Name | Use | Tag | Range | Description |
|--------------------------------|-----|-----------|-------|-----------------------------------|
| Sequence of Ultrasound Regions | 1 | 0018,6011 | | Used |
| >Region Spatial Format | 1 | 0018,6012 | 1,2,3 | Used |
| >Region Data Type | 1 | 0018,6014 | 1 | Used |
| >Region Flags | 1 | 0018,6016 | 0 | Used |
| >Region Location MinX0 | 1 | 0018,6018 | 0-799 | Used |
| >Region Location MinY0 | 1 | 0018,601a | 0-599 | Used |
| >Region Location Max X1 | 1 | 0018,601c | 0-799 | Used |
| >Region Location Max Y1 | 1 | 0018,601e | 0-599 | Used |
| >Reference Pixel X0 | 3 | 0018,6020 | 0 | Used if Region Spatial Format = 3 |
| >Reference Pixel Y0 | 3 | 0018,6022 | 0-xxx | Used if Region Spatial Format =3 |
| >Physical Units X Direction | 1 | 0018,6024 | 3,4 | Used |
| >Physical Units Y Direction | 1 | 0018,6026 | 3,7 | Used |
| >Physical Delta X | 1 | 0018,602c | | Used |
| >Physical Delta Y | 1 | 0018,602e | | Used |

SOP Common Module Elements

| Name | Use | Tag | Range | Description |
|---------------------------------|-----|------------|--|---|
| SOP Class UID Image Storage. | 1 | 0008, 0016 | 1.2.840.10008.5.1.4.1.1.6.1 1.2.840.10008.5.1.4.1.1.3.1. 1.2.840.10008.5.1.4.1.1.7 | Used for US image storage Used for US multiframe image storage Used for Secondary Capture storage |
| SOP Instance UID | 1 | 0008, 0018 | xxx | Same as in Command Set |
| Specific Character Set | 1C | | | Not used |
| Instance Creation Date | 3 | | | Not used |
| Instance Creation Time | 3 | | | Not used |
| Instance Creator ID | 3 | | | Not used |

2.2 Worklist AE - Specification

The Worklist AE provides conformance to the following DICOM SOP Classes as an SCU:

| SOP Class Name | SOP Class UID | Conformance Level |
|--|------------------------|-------------------|
| Modality Worklist Information Model - FIND | 1.2.840.10008.5.1.4.31 | Standard Extended |

Association Establishment Policies

The Worklist AE will initiate an association when the user invokes the Search command.

2.2.1.1 General

Maximum PDU size offered: 28,672 bytes

Minimum PDU size accepted: 1,024 bytes

2.2.1.2 Number of Associations

Maximum number of simultaneous associations: 1

2.2.1.3 Asynchronous Nature

The Worklist AE will not use asynchronous operations window negotiation.

2.2.1.4 Implementation Identifying Information

Implementation Class UID: "1.2.276.0.26.20010718.240"

Implementation Version name: "KRETZDICOM_240"

Notes: Version name above will be used initially but is subject to change with versions.

Association Initiation by Real-world Activity

The Worklist AE will open association to the Worklist Server when the real-world activity occurs corresponding to the user invocation of Search. The association is closed at completion of the query.

2.2.1.5 Association Initiation by: "Search"

The user invocation of "Search" will cause an association to be initiated to an Worklist server.

2.2.1.5.1 Proposed Presentation Context to an Worklist Server

Worklist AE Proposed Presentation Contexts to a Worklist Server

| Presentation Context Table | | | | | |
|--|------------------------|---|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 | DICOM Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 | SCU | None |

2.2.1.5.1.1 SOP Specific Conformance Statement to Modality Worklist Service SOP Class

Each module which is used by the Worklist AE has a table below which indicates the elements supported.

Scheduled Procedure Step Module Elements

| Name | Tag | Return Type | Mapped into image | Description |
|--|------------|-------------|-------------------|-----------------------------------|
| Scheduled Procedure Step Sequence | 0040, 0100 | 1 | No | Used |
| >Scheduled Station AE Title | 0040, 0001 | 1 | No | Used |
| >Scheduled Procedure Step Start Date | 0040, 0002 | 1 | No | Used |
| >Scheduled Procedure Step Start Time | 0040, 0003 | 1 | No | Used |
| >Modality | 0008, 0060 | 1 | Yes | "US" or zero length |
| >Scheduled Performing Physician's Name | 0040, 0006 | 2 | Yes | Used |
| >Scheduled Procedure Step Description | 0040, 0007 | 1C | No | Used |
| >Scheduled Station Name | 0040, 0010 | 2 | No | Used if present in the query form |
| >Scheduled Procedure Step ID | 0040, 0009 | 1 | No | Used |

Requested Procedure Module Elements

| Name | Tag | Return Type | Mapped into image | Description |
|---------------------------------|------------|-------------|-------------------|--------------------|
| Requested Procedure ID | 0040, 1001 | 1 | No | Used |
| Requested Procedure Description | 0032, 1060 | 1C | No | Used for Exam Type |
| Study Instance UID | 0020, 000D | 1 | No | Used |

Imaging Service Request Module Elements

| Name | Tag | Return Type | Mapped into image | Description |
|----------------------------|------------|-------------|-------------------|-------------|
| Accession Number | 0008, 0050 | 2 | Yes | Used |
| Referring Physician's Name | 0008, 0090 | 2 | Yes | Used |

Patient Identification Module Elements

| Name | Tag | Return Type | Mapped into image | Description |
|----------------|------------|-------------|-------------------|-------------|
| Patient's Name | 0010, 0010 | 1 | Yes | Used |
| Patient ID | 0010, 0020 | 1 | Yes | Used |

Patient Demographic Module Elements

| Name | Tag | Return Type | Mapped into image | Description |
|----------------------|------------|-------------|-------------------|-------------|
| Patient's Birth Date | 0010, 0030 | 2 | Yes | Used |
| Patient's Sex | 0010, 0040 | 2 | Yes | Used |
| Patient's Size | 0010,0020 | | | |
| | | | | |

3 Communication Profiles

3.1 TCP/IP Stack Supported

The TCP/IP protocol is used. The port address is configurable as stated elsewhere in the spec DCS.

Physical Media Supported

Standard IEEE 802 (Ethernet) 10BaseT (twisted pair), 10Base2 (thin coax) and 10BaseFL (Fiber Optic Link) are supported. Destination Ethernet address shall be acquired using the Address Resolution Protocol (ARP). Internet Protocol (IP) address shall be acquired manually and pre-loaded into the device.

4 Extensions/Specializations/Privatizations

4.1 Standard Extended/Specialized/Private SOPs

None

4.2 Private Transfer Syntaxes

None.

5 Configuration

This device obtains configuration information at the time of installation to provide the following.

mapping from Application Entity Title to Presentation Address

device configuration information

5.1 AE Title/Presentation Address Mapping

The translation from AE Title to Presentation Address is to be performed using a look up table loaded at installation or some other time.

5.2 Configurable Parameters

A lookup table contains the following configuration parameters.

Application Entity Title

IP Address

Port number

6 Support of Extended Character Sets

Extended character sets are not supported.