



Hipax Workstation 4

Table of Contents

1. WS4 BASE MODULES	2
1.1 WS4 HIPAX BASE MODULE STANDARD (01-010)	2
1.2 WS4 BASE MODULE, "LIGHT" (01-020)	3
2. WS4 IMAGE ACQUISITION MODULES	3
2.1 WS4 CR CONNECTION (01-030)	3
2.2 WS4 DR CONNECTION (01-290)	3
2.3 WS4 X-RAY DIGITISING: VIDAR (01-060).....	4
2.4 WS4 X-RAY DIGITISING: TWAIN (01-070)	4
2.5 WS4 VIDEO: DIRECT INTERFACE (01-090)	4
2.6 WS4 VIDEO: HI-LINE (01-220).....	4
3. WS4 MODULES FOR WORKFLOW	5
3.1 WS4 EXTENDED GDT INTERFACE (01-250)	5
3.2 WS4 DICOM WORKLIST (SCU) (01-180).....	5
3.3 WS4 AUTOROUTING (SCU) (01-360).....	5
4. WS4 COMMUNICATION MODULES	6
4.1 WS4 DICOM COMMUNICATION (01-200).....	6
4.2 WS4 DICOM EMAIL (01-270)	6
4.3 WS4 TELECONFERENCE CLIENT (01-240).....	6
5. WS4 MODULES FOR IMAGE OUTPUT (CD, DVD, PRINT)	7
5.1 WS4 LOCAL OFFLINE ARCHIVE (01-110).....	7
5.2 WS4 PATIENT CD (01-120).....	7
5.3 WS4 CD/DVD ROBOT (01-280).....	7
5.4 WS4 DICOM PRINT (SCU) (01-190)	8
6. WS4 IMAGE DISPLAY	8
6.1 WS4 PRESENTATION (01-130)	8
6.2 WS4 MULTI MONITOR (01-150)	8
6.3 WS4 STITCHING (01-230)	9
7. OTHER HIPAX WS4 MODULES	9
7.1 WS4 DATABASE MANAGER (01-160)	9
8. WS4 NETWORK LICENSE	9
9. SYSTEM REQUIREMENTS FOR HIPAX WORKSTATION 4	10





1. WS4 Base Modules

The base module is part of each Hipax Workstation 4 installation for medical imaging and can be made up by additional modules to a powerful image processing and administration system. It supports all common image formats for PC as well as the DICOM format. The base module offers a couple of functions specially needed to process radiographies.

The Hipax Workstation 4 offers two base modules with different extends of functions. The Base Module Standard (see *chapter 1.1*) and the Base Module "light" (see *chapter 1.2*).

1.1 WS4 Hipax Base Module Standard (01-010)

The Base Module Standard includes the general image processing functions, which are available for all image types: colour images as well as grey scale images, series and multiframe images. The Base Module can be combined with all other Hipax modules for medical imaging.

Functions for Image/Patient Administration:

- image and patient administration
- simple interface to patient administration systems
- image review

Functions to Process Single Images:

- processing of grey and colour images
- adjustment of contrast and brightness
- colour remapping and reverse video
- window-levelling in 10, 12, and 16-bit grey images, histogram, density profile
- centre/window presets
- image optimization (region of interest, e.g. unsharp mask filters, edge enhancement)
- magnifying glass
- image zooming
- rotating and reflecting
- image display in fixed tiles (e.g. 1x1, 2x1, 3x2, 3x3, 3x4, 5x4)
- cropping and processing of areas
- full screen display of images with interpolation
- image import, also from CD, image export (DICOM, TIFF, BMP, JPEG etc.)
- import of several images at one time (directory import)
- printing with different layouts on Windows printers
- interface to a foot-switch (e.g. for grabbing video images)
- writing and marking
- measurement of lines, angles and areas, measurement macros



Functions for Multilayer (e.g. CT, MRI) and Multi-Frame (e.g. XA, US, NUK) Images:

- hanging protocol
- display in stacks or side by side (spread mode)
- paging through series or sequence stacks
- synchronized paging through two or more image stacks
- synchronized comparison of two series by screen splitting
- cine-loop of image stacks forwards and backwards at any speed
- cine-loop of several sequences at one time
- zoom on whole series or sequence
- centre/window levelling of single images or of the whole series or sequence
- marking single images of a series or sequence
- selection of relevant layers
- printing either single images or a whole series or sequence
- series import/export (TIFF, BMP, JPEG, PNG, DICOM 3)

1.2 WS4 Base Module, "light" (01-020)

The Hipax Base Module "light" is a simplified version of the standard base module and can be used for viewer workstations. It offers all functions necessary to process and administrate single colour or grey images. The Base Module "light" can only be combined with the Hipax DICOM Communication module.

2. WS4 Image Acquisition Modules

We are offering different modules to connect image donors directly or indirectly to Hipax. Receiving images via DICOM requires the DICOM communication module, which is described in *chapter 3*.

2.1 WS4 CR Connection (01-030)

Using this module, images can be adopted directly from different non DICOM capable CR (computed radiography) systems, e.g. iCRco (Cobra-Scan), Orex (Kodak). Interfaces to further CR systems are offered by different OEM versions of Hipax. For image optimization, special filters are available. The basic image delivered by the CR system can be kept as an option storing the filters as macros.

Functions:

- direct adoption of images from the CR system
- specially adapted filter presets for image optimization
- optionally keeping the basic image and storing the filters as macros
- administration of the X-ray dosis indicator data

2.2 WS4 DR Connection (01-290)

The DR module enables the user to adopt images directly from non DICOM capable DR (direct radiography) systems, e.g., Thales, Varian. For image optimization, special filters are available. The basic image delivered by the DR system can be kept as an option storing the filters as macros.

Functions:

- direct adoption of images from the DR system
- specially adapted filter presets for image optimization
- optionally keeping the basic image and storing the filters as macros
- administration of the X-ray dosis indicator data



2.3 WS4 X-ray Digitising: Vidar (01-060)

The Vidar module has been developed especially to drive the Vidar X-ray digitizers.

Functions:

- driving the Vidar digitizer directly
- support of the stroke batch mode (automatic indexing of single films from a batch)
- 12 bit digitization of X-rays in the grey mode
- rotating and reflecting images that have been digitized from the wrong side
- entering marks for the left and right body side into the digitized image
- using look up curves to the digitized image
- optionally: cutting digitized X-rays in single images, e.g. CT series

2.4 WS4 X-ray Digitising: TWAIN (01-070)

Each TWAIN capable X-ray digitizer can be connected using the Hipax TWAIN/Scan module. Furthermore, images can also be adopted from other TWAIN sources, e.g. a still video camera.

Colour formats: 8, 10, 12 bit grey; 24 bit RGB colour

Resolution: 2.5-7.5 Lp/mm (line pairs per mm), depending on the used digitizer.

Functions:

- 12 bit digitization of X-ray images in the grey mode
- automatic window levelling (Centre/Window)

2.5 WS4 Video: Direct Interface (01-090)

Using the Hipax Video module, single images or whole sequences can be grabbed from devices providing a video plug.

Standard video signals can be grabbed by any standard frame grabber card to be addressed by DirectShow driver (e.g. DFG/SV1), or by Matrox Morphis MOR/2VD. For non-standard video signals please use Matrox Meteor II Multi Channel, or Matrox Solios XA/Xe. The frequency of grabbed images depends on the frame grabber and on the performance of the PC.

Functions:

- digitising single images or whole cine-loops (24 bit RGB or 8 bit grey) from a device with video plug
- live mode and freeze
- image export in PC and DICOM formats, or avi files
- DICOM 3 conversion
- video filters: subtraction to fade out body structures of less interest, average to suppress the noise
- a foot switch can be used to grab, store and/or transmit the images

2.6 WS4 Video: Hi-Line (01-220)

Using the Hi-Line module, Hipax is able to adopt single images from devices without video plug, directly from the screen, via the VGA plug. To make this, a Foresight frame grabber is required, e.g., I-RGB-165, ACCUSTREAM 170, I-50, or I-60. The connection between Hipax and the frame grabber is made using a TWAIN driver.

Functions:

- grabbing high frequent signals from devices without video plug
- driving the Foresight high lines frame grabbers via TWAIN
- only single images no sequences
- creating image series



3. WS4 Modules for Workflow

3.1 WS4 Extended GDT Interface (01-250)

Integration of Hipax into a patient administration system. In contrast to the free Hipax interfaces via ini files or GDT/BDT, the extended GDT Interface is not only able to receive patient data from the patient administration system, but also to send data back.

Functions:

Hipax supports the following record types:

- 6301 Surrender of basic data. The patient data are transmitted from the patient administration system to Hipax, and stored in the local database. If a patient entry already exists, the corresponding image review is opened automatically.
- 6302 Enquiring new studies. The patient administration system delivers data to Hipax in order to carry out a new study.
- 6310 Surrendering the data of a study. Hipax sends the result of a study back to the patient administration system, if this has been enquired previously.
- 6311 To show the data of a study. To be processed as 6301.

3.2 WS4 DICOM Worklist (SCU) (01-180)

The Hipax WS4 module DICOM Worklist (SCU) can be installed on an image acquisition workstation. It adopts the worklists provided by a DICOM Worklist (SCP) server. The patient data taken from the worklists are then inserted automatically into the local database. Thus, patient data must not be entered manually.

Note: Using the DICOM Worklist (SCU) module, the DICOM Communication module (05-200) must also be installed on the same workstation.

3.3 WS4 Autorouting (SCU) (01-360)

Using the WS4 Autorouting function, images received from a DICOM modality can be forwarded automatically to a DICOM or DICOM Email capable destination. This function can, for example be interesting to integrate the Hipax Email function into the PACS of another manufacturer.

Note: The Autorouting function is only working together with the DICOM Communication module (05-200).



4. WS4 Communication Modules

4.1 WS4 DICOM Communication (01-200)

With the DICOM Communication module, Hipax can receive or transmit images using the DICOM 3 network protocol. For example, a CT can send images directly to the Hipax PC.

Furthermore, the DICOM Communication module can be used for external communication (dial up network). For reasons of data security, the images can be encrypted and compressed.

Functions

- patient selection (Find/Query SCU)
- moving images (Move SCU)
- sending images (Store SCU)
- receiving images (Store SCP)
- query/retrieve
- automatic storage of received images in the database
- communication within a network as well as with remote stations
- different compression modes with factor 3 to 20
- several connections can be made at the same time
- besides the image data other files as documents, sound files and films can be encrypted and compressed to be sent to another Hipax station (doc, txt, xls, ppt, wav, mpg, avi, wmv files)

4.2 WS4 DICOM Email (01-270)

The module DICOM Email can be used to send and receive images via e-mail according to DICOM Supplement 54. This also enables the exchange of images with systems of other manufacturers.

To use the DICOM Email module, the DICOM Communication module has also to be installed.

Functions:

- image transmission via Email
- encryption (PGP or SSL)
- lossless compression factor 2 (Bzip)
- image exchange with systems of other manufacturers
- splitting big images or series to the maximum size accepted by the provider
- DICOM Supplement 54

4.3 WS4 Teleconference Client (01-240)

The Teleconference Client allows the user to take part in a common image discussion and image processing, together with up to 15 other physically separated participants. The different steps of the image processing are transmitted to the clients as commands.

Before the teleconference starts, the images to be discussed are sent to each of the participants. The transmission can be carried out using the Hipax communication modules DICOM or ISDN.

Functions:

- determination of the master user
- image processing (selecting an image, zoom, changing brightness/contrast, window levelling)
- moving up to four coloured arrows simultaneously

The supposition to carry out a teleconference is the availability of a Hipax Teleconference Server. Please contact your Hipax partner or the manufacturer for more information.



5. WS4 Modules for Image Output (CD, DVD, Print)

5.1 WS4 Local Offline Archive (01-110)

The Archive module can be used to store the oldest images manually on digital media (CD, DVD). The image copies on the hard disk are then removed to save memory, while the corresponding JPEG thumbnails and the patient data remain there for identification. Verify procedures make sure that a loss of data cannot occur.

The module includes a compression tool and a CD/DVD-writer program.

Functions:

- the oldest image data are made available for archiving automatically
- lossless compression of the archived images by factor 3 can be selected
- CD/DVD-writer program
- verification of the media
- automatic administration of the disk labelling in the database
- printing disk labels
- reimport of images archived on CD or DVD

5.2 WS4 Patient CD (01-120)

Using this module, the referring physician can write images as well as documents, video files and sound files of a patient on CD. The CD can be handed out to the patient or directly to another doctor. Besides the images and patient data, the CD contains a simple Hipax viewer, which allows a physician to view the images on any PC. Furthermore, the module can be used to produce DICOMDIR CDs with cardiac cine-loops.

Functions:

- writing patient data, reports, and images on CD
- CD/DVD-writer program included
- a simple Hipax viewer is added to the CD starting automatically after inserting the CD into the drive
- user interface of the viewer offering different tools for image optimization to be operated easily
- if Hipax is installed on the PC, the installed version is started instead of the CD viewer
- the images stored on the CD can be read by systems of other manufacturers (DICOMDIR)

5.3 WS4 CD/DVD Robot (01-280)

The Hipax module CD/DVD Robot enables the user to connect a CD- or DVD robot of the Primera Disc Publisher group to a Hipax workstation. Thus, patient CDs or archive media can be produced fully automatic directly from the Hipax viewer. To make this, the Local Archive (01-110) or Patient CD (01-120) needs also to be installed.

Hipax writes the data into a temporary folder, where the CD/DVD robot can read them automatically and write them on the media. The integrated printer of the robotic system prints the patient data (name, first name, birth date, ID, etc.) from the DICOM header on the disk. Thus, the CD/DVD is identified and can be handed out to the patient or to the archive. The praxis logo or other information can also be printed.

Note: The Primera PT-Burn software is not included in the Hipax module and must be purchased from Primera.



Functions:

- reading the Hipax Export folder or Archive folder
- writing the data on CD/DVD automatically
- printing the label automatically (4800 dpi)
- producing single media or up to 50 identical CDs/DVDs in one operation

5.4 WS4 DICOM Print (SCU) (01-190)

With the DICOM Print module, images can be sent to a DICOM printer to print images on film. The DICOM Print module works as a Service Class User (SCU) for the DICOM print classes (BASIC Greyscale Print Classes). Images can be transmitted directly from the Hipax image processing software to the DICOM printer.

Functions:

- free configuration of the DICOM parameters for the individual adaptation to different printers
- defining up to 16 different printer layouts
- use of the DICOM data annotation or "burning" of the text onto the image
- 1:1 display of X-rays on films (STANDARD/1,1)
- several DICOM printers can be driven at the same time.

6. WS4 Image Display

6.1 WS4 Presentation (01-130)

The presentation module can be used to demonstrate prepared images. In a conference, for example, images can be projected with a video beamer to a screen. Even larger images can be loaded quickly. The preparation of a presentation can be carried out completely on one Hipax station, or parts of a presentation can be created at different Hipax stations and put together later.

Functions:

- administration of up to 4 presentations
- any given change of the succession of patients or images
- free choice of image display: display in tiles with 2, 4, 6, 9, 16, 25 or 49 images
- paging, image comparison
- subsequent adjustment of image areas, centre/window values and image display
- sending and completing of (parts of) presentations via the network

6.2 WS4 Multi Monitor (01-150)

Hipax offers the possibility of working with 2 or more monitors. A graphics adapter is needed, which is able to split the Windows desktop on different screens.

Functions:

- configuration of 2,3 or 4 landscape or portrait monitors
- assigning an image or series to one monitor
- each monitor can display up to 48 images
- the images of each monitor can be processed individually
- quick paging
- display of different image types at the same time, e.g. monitor 1: MR series, monitor 2: CR chest
- in the series review mode up to 1024 images can be displayed at the same time



6.3 WS4 Stitching (01-230)

Using the Stitching module, two images can be put together to one. In doing so, one of the images remains fixed, while the other can be rotated in 0.1° steps, moved and finally even overlapping be combined with the fixed image. The module can, for example, be used for long leg X-rays.

Images to be combined must have been created by the same modality, and they must be of the same type (colour or grey, 8 Bit or 12 Bit, small or broad).

Functions:

- attaching a free movable image to a fixed image
- rotation of the movable images in 0.1° steps
- free change of the order of the two images – vertically or horizontally
- storage of the combined images as a new image file
- adding further images to already united images

7. Other Hipax WS4 Modules

7.1 WS4 Database Manager (01-160)

This module complements the Hipax database. Keywords can be added to single images or patients. The keywords then are available for an evaluation. In this way, for example teaching collections can be drawn up.

Functions:

- evaluation on patient level or image level
- relating up to 4 additional keywords to each patient or image
- relating additional texts (e.g. anamnesis, diagnosis, therapy, etc.)
- fast evaluation using preset queries
- creating and administrating own query macros basing on SQL

8. WS4 Network License

In a practice or hospital network, the Hipax Workstation 4 can be used with a network dongle. As a result, all single Hipax installations are licensed by the same dongle. The Hipax Workstation 4 can be installed on all PCs of the network. The number of licenses to be used at the same time are defined by the network dongle.



9. System Requirements for Hipax Workstation 4

Note: The performance of the software increases with the capability of the hardware.

- Pentium IV CPU with 2.8 GHz or more, or comparable AMD processor in Windows 2000 or XP
- Minimum 1 GB main memory, depending on the demands; 2 GB for cardiology
- At least 80 GB hard disk, depending on the volume of the data to be saved temporary
- Analogous color monitor, 17" or 20" inches for demonstration, hires monitor for diagnoses
- Graphics card, resolution of 1280×1024 or more, in True Color mode. Special medical mega pixel PCI graphics card for diagnosis
- Network card to use the Hipax Workstation within a network
- CD or CD/DVD drive to install the program and to read media
- LPT or USB plug for the dongle

Using a medical Megapixel PCI graphics card, it must be put into a PCI-X or PCIe slot, because PCI-X and PCIe deliver significantly higher internal data transfer rates than "normal" PCI slots. To make this, a mother board with PCI-X or PCIe is required.

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