Drystar 4500

User manual

Point of > Knowledge

AGFA

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Chapter 1

Introducing the Drystar 4500

This chapter introduces the Drystar 4500 to the user and draws attention to important safety precautions.

Drystar 4500 features

The Drystar 4500 is a **dry digital printer** for producing diagnostic black and white hard copies. It can use both 8x10" and 10x12" blue-based and clear-based film and offers crisp, dense grayscale images.

The Drystar 4500 is a Dicom-only network printer.

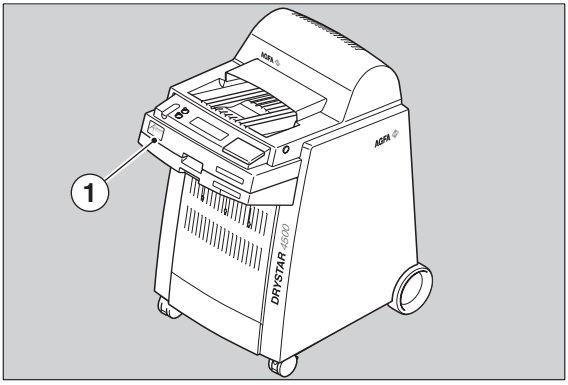
The Drystar 4500 has limited support for the Helios protocol. Ask your AGFA representative for more details.

The Drystar 4500 offers the following features:

- Dry technology for printing diagnostic quality hard copies in full daylight offers important advantages: no chemistry, no wet processing, simple cleaning procedures, no time-consuming adjustments, no darkroom and no chemical disposal costs. The consumables can be loaded in full daylight.
- With its compact design, the Drystar 4500 needs little work space and allows easy customer access. Maintenance and service activities are reduced to the minimum.
- The direct thermal printing system provides grayscale images with laser-like quality: 508 dots per inch resolution, each pixel with a 12 bit contrast resolution and an optical density up to 3.1 (if an X-Rite 310 densitometer is used).
- The built-in image spooling on hard disk assures a high throughput. Printing time is kept to a minimum.
- Both 8x10" and 10x12" films can be used "on-line". The upper tray only uses 8x10" films, but the setting for the lower input tray can be adjusted for either 8x10" or 10x12" films.

- Integrated A#sharp technology: A#sharp is a technology that enhances image sharpness for the Drystar 4500. An A#sharp label on the upper tray shows that the imager has been upgraded with this technology.

The A#sharp technology is present in Software version 3.00 and higher.



1	A#Sharp label

Network features

- The modular design offers optimal application to your specific networking requirements.

  In a network configuration, the Drystar 4500 is fully compatible with Agfa's diagnostic imaging systems, including the ADC Compact and ADC Quality System software, the Paxport and the entire line of Impax Review Systems, Storage Stations and Transmitting Stations.

- The functionality of the Drystar 4500 is completely controlled via the network.

- You can control the working of the Drystar 4500 via the local keypad or via a remote PC featuring a browser page functionality.

Customizable features

- Film size in lower input tray.

  The key-operator can adjust the film size setting for the lower input tray (either 8x10" or 10x12"). Refer to *'Changing the film format of the lower tray'* on page 162 of the Drystar 4500 Reference manual.

- Consumables.

  The Drystar 4500 can handle Drystar DT 1 B and Drystar DT 1 C consumables, both in 8x10" and in 10x12" format.

Optional features

- Postscript connectivity.

  A Postscript software module can be installed as an option. No hardware modifications are required prior to the installation of the Postscript module.

Safety precautions

The device must only be operated according to its specifications and its intended use. Any operation not corresponding to the specifications or intended use may result in hazards, which in turn may lead to serious injuries or fatal accidents (for example electric shocks). AGFA positively will not assume any liability in these cases.

It is advisable to switch off the Drystar 4500 if you do not have to use it for a period longer than one day.

When operating or maintaining the Drystar 4500, always observe the following safety guidelines:

- Have electrical or mechanical defects repaired by skilled personnel only!
- Do not override or disconnect the integrated safety features.
- Ventilation openings may not be covered.
- Always switch off the Drystar 4500 and disconnect the power cord from the outlet before carrying out any maintenance work.

Film jam removal or Cleaning the printer head can be done without switching the power off. Nevertheless, care should be taken and the following instructions should be respected:

Always take into account the markings provided on the inside and outside of the printer. A brief overview of these markings and their meaning is given below.

	Safety warning, indicating that the Drystar 4500 manuals should be consulted before making any connections to other equipment. The use of accessory equipment not complying with the equivalent safety requirements of this printer may lead to a reduced level of safety of the resulting system. Consideration relating to the choice of accessory equipment shall include: • Use of the accessory equipment in the patient vicinity, • Evidence that the safety certification of the accessory equipment has been performed in accordance with the appropriate IEC 601-1 and IEC 601-1-1 harmonized national standard. In addition all configurations must comply with the medical electrical systems standard IEC 601-1-1. The party that makes the connections acts as system configurator and is responsible for complying with the systems standard. If required contact your local service organization.

	In order to reduce the risk of electric shock, do not remove any covers.
	Type B equipment: Indicates that the Drystar 4500 complies with the limits for type B equipment.
	Supplementary protective earth connector: Provides a connection between the Drystar 4500 and the potential equalization busbar of the electrical system as found in medical environments. This plug should never be unplugged before the power is turned off and the power plug has been removed.
	Intergrounding connector: Provides a connection between the printer and other equipment which might exhibit minor ground potential differences. These differences may degrade the quality of communication between different equipment. Never remove connections to this terminal.
	Protective earth (ground): Provides a connection between the printer and the protective earth of the mains. Do not remove this connection, because this will have a negative influence on the leakage current.
	Power/Reset Button (Standby switch) Note that the power cord has to be disconnected from the wall outlet in order to disconnect the unit entirely from the mains.
	Precautions for use in USA only: Make sure that the circuit is single-phase center-tapped, if the printer is connected to a 240 V/60 Hz source instead of a 120 V/60 Hz source.

Transport after installation

Before moving the printer, always switch off the machine. The user has to be very cautious concerning stability, when moving the printer. When doing this, he has to take into account the condition and the structure of the subsoil, obstructions and slopes. The appliance can only be transported with all covers closed. The appliance may not be transported continuously from one location to the other.

To prevent injuries, lock the brakes when the Drystar 4500 is in place at the right location.

Waste disposal and environmental regulations

In most countries Drystar film is considered industrial waste and consequently it is not allowed to dispose of it as household waste. Please consult your local waste disposal regulations. Agfa recommends to have waste Drystar film hauled away by a licensed company.

After its life span, do not dispose of the Drystar 4500 without consideration of local waste disposal regulations. Please consult your local service organization.

Security precautions

CAUTION (U.S.A. only): In accordance with U.S. Law, this device can only be sold to or ordered by a licensed physician.

Printed images should be treated as patient records and should only be viewed by authorized personnel.

It is good practice not to delete images from the modality, until they have been correctly printed.

Safety compliance

EMC issues

- USA: This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at its own expense.
  If required, contact your local service organization.
- Canada: This class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
- EC: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Compliances

This equipment complies with:

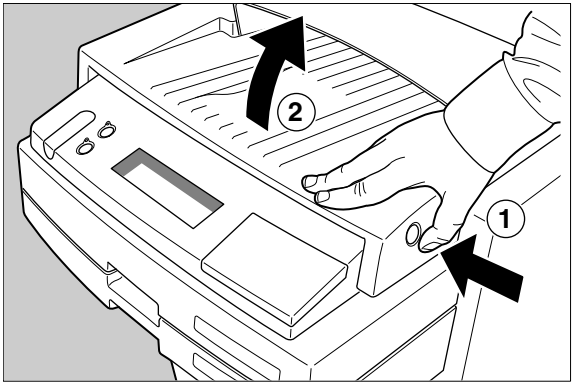
- the Medical Devices Directive 93/42/EEC
- the standards UL2601-1 of Underwriters Laboratories
- CSA 22.2 No. 601.1-M90 of the Canadian Standards Association
- FDA 510k
- FDA Part 820 Good manufacturing Practice for Medical devices
- IEC 601-1 and IEC 601-1-1
- DOH
- VDE 0750 Teil 1 (12.91)
- TÜV

Labels

The Drystar 4500 carries the CE, TÜV, cULus and CCC labels.

To find the label location

1 Press the button [1] on the right hand side to open [2] the top cover.



2 The label is visible at the inside of the printer at the left.

Privacy and security

Within the healthcare industry, several standardization efforts are ongoing as a response to Privacy and Security legislation and regulations. The purpose of this standardization for hospitals and vendors is to enable information sharing, interoperability and to support the workflow of hospitals in a multiple vendor environment.

In order to allow hospitals to comply with HIPAA regulations (Health Insurance Portability and Accountability Act) and to meet the IHE standards (Integrated Healthcare Enterprise) some security features are included in the user interface of the Drystar 4500 (available via the web pages only: under 'Security tools'. Refer to *'Controlling the Drystar 4500 via the browser'* on page 147 of the Drystar 4500 Reference manual):

- Product Authentication: HIPAA supported products that communicate with DICOM use the Transport Layer Security (TLS) protocol. The TLS protocol uses public key certificates for client and server authentication (X.509).
- Product Accountability: HIPAA supported products require some level of user and system activity to be recorded. As a consequence of these actions, audit records are to be sent to and observed at an Audit Record Repository (ARR).
- Product User Authentication: 'User Authentication' of HIPAA products involves password protection for access to User, Key operator, Service Security/ Administrator and other user interfaces that allow access to protected health information (PHI). These interfaces include all user keypads, front panels displays and network connections.

The last two functions are available when access to the Administrator is granted (i.e. when the Administrator password has been entered correctly).

Operating modes

The Drystar 4500 can be operated in four modes: operator mode, key-operator mode, service mode and specialist mode.

Operator mode

The operator mode groups all basic functions which are aimed at radiographers without special technical skills:

- Producing diagnostic usable hard copies;
- Loading consumables;
- Ensuring normal operation of the printer.

All functions of the operator mode are described in both User and Reference manuals. Refer to Chapter 2, *'Basic operation (operator mode)'.*

Key-operator mode

The key-operator mode groups advanced functions which are aimed at technically skilled operators such as X-ray operators, network managers and service and hospital technicians.

The key-operator mode can be accessed via the Key-operator key on the keypad and is menu-driven. The key-operator functions are described in the Reference manual only. Refer to Chapter 3, *'Advanced operation (key-operator mode)'.*

Service mode

The service mode functions are reserved for trained service personnel. The service mode is password protected.

Specialist mode

The specialist mode functions are reserved for trained service personnel. The specialist mode is password protected.

Administrator mode

The Administrator mode functions are reserved for the System Administrator. The Administrator mode is password protected and is only accessible by browser via a remote PC. Refer to *'Privacy and security'* on page 15.

Control modes (local and remote)

You can control the working of the Drystar 4500 via the local keypad or via a remote PC.

The table below gives an overview of the operating modes you can access locally or via the remote PC.

Local	Password protected	Remote	Password protected
Operator mode	No	Operator mode	No
Key-operator mode	No	Key-operator mode	Yes
Service mode	Yes	Service mode	Yes
——	——	Specialist mode	Yes
——	——	Administrator mode	Yes

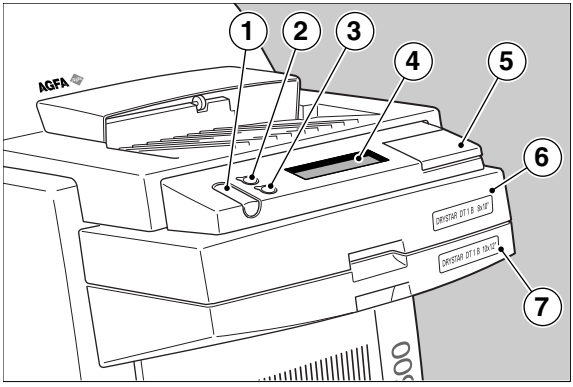
The manual describes the controlling of the Drystar 4500 via the keypad. When controlling the Drystar 4500 via a remote PC, the menus are structured in the same way. Refer to *'Controlling the Drystar 4500 via the browser'* on page 147 of the Drystar 4500 Reference manual.

The user interface

The Drystar 4500 interfaces with the user via the following controls:

- Power/Reset button;
- Stop button;
- a keypad and a display;
- a status indicator LED;
- audio signals.

Overview of user interface controls:



1	Status indicator LED
2	Power/Reset button
3	Stop button
4	Display
5	Keypad cover
6	Film input tray (Upper input tray)
7	Film input tray (Lower input tray)

Never try to open the printer or a film input tray when the Drystar 4500 is busy printing a film. Always follow the instructions on the display!

The status indicator LED

At the left side of the display, a LED indicates the status of the Drystar 4500:

Color / Light		Status	Action
Green	**Constant**	Ready (standby)	Proceed
	Blinking	Busy or in key-operator mode	Wait
Red	**Blinking**	Warning status	Check the display for messages. Refer to *'Checking the status indicator LED'* on page 173.
	Constant	Error status	

The control buttons

Two control buttons have been provided:

	**Stop** button	• To safely stop the printing process before accessing the input trays or opening the covers.
	**Power/Reset** button	• To power on or off the printer. • To reset the printer.

Do NOT press the Power/Reset button without first pressing the Stop button when the Drystar 4500 is busy printing a film. Refer to *'Switching off the Drystar 4500'* on page 28.

Audio signals

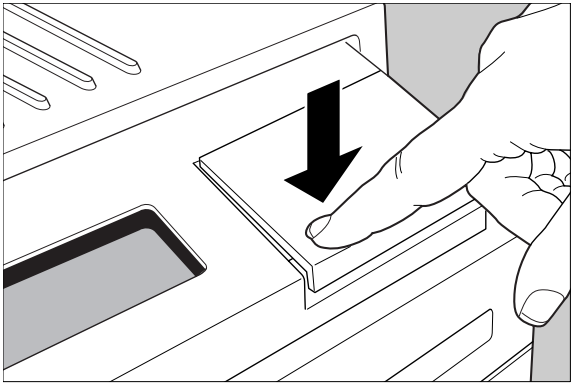
The Drystar 4500 gives status information via beeps. The length of the beep indicates the response of the system to a key command.

- A **short** beep means that Drystar 4500 has accepted the key command and is starting the operation.
- A **long** beep means that you have pressed a non-active key or that the Drystar 4500 has rejected the key command.

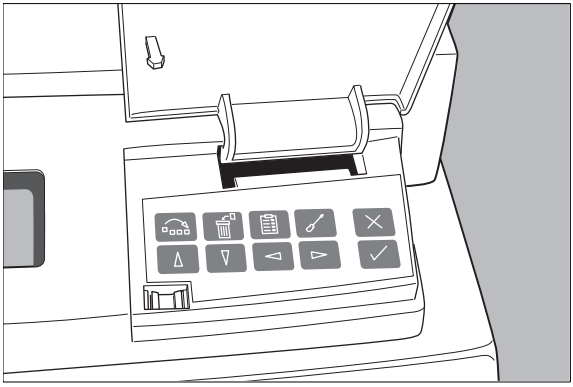
Certain conditions can cause an interval beep. An interval beep accompanies an error or warning message. Refer to 'Troubleshooting checklists' on page 67.

The keypad

To access the keypad, push the keypad cover in the lower left corner.



The keypad is located under the keypad cover.



The Drystar 4500 keypad features the following keys:

	**Emergency** key	To rearrange the print queue: emergency jobs can be placed at the top of the queue to be printed with priority. Refer to *'Assigning emergency priority'* on page 33.
	**Delete** key	To delete print jobs. Jobs that are deleted will not be printed. Refer to *'About Drystar 4500 consumables'* on page 36.
	**Key-operator** key	To access the advanced functions of the key-operator mode. Refer to Chapter 3, *'Advanced operation (key-operator mode)'*.
	**Service** key	To access service-level functions. Reserved for trained service personnel.
	**Escape** key	To quit the current function or exit a menu without saving modifications.
	**Confirm** key	(In key-operator mode) • To select a menu. • To accept an entry in a menu.
	**Up** key	• To move the cursor to the previous entry field. • To scroll upwards. • To increment the number in a(n) (alpha)numerical entry field.
	**Down** key	• To move the cursor to the next entry field. • To scroll downwards. • To decrement the number in a(n) (alpha)numerical entry field.
	**Left** key	• To scroll backwards through multiple choices within a field. • To move the entry position in a(n) (alpha)numerical entry field from right to left. • To toggle between values in a field.

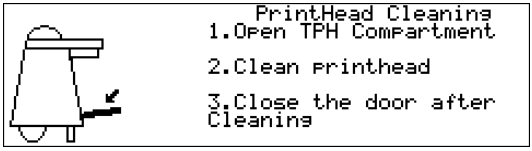
	**Right** key	• To scroll forwards through multiple choices within a field. • To move the entry position in a(n) (alpha)numerical entry field from left to right. • To toggle between values in a field.

You can hold down an arrow key to scroll quickly through a list or a menu.

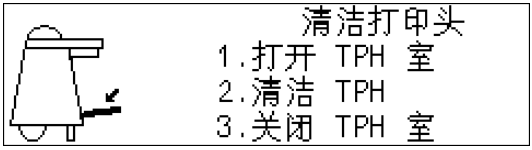
The display

The Drystar 4500 control panel has a backlit LCD display. We distinguish two panel types depending on the selected language:

- a backlit LCD display with 8 lines for Western languages (e.g. Dutch, French, Portuguese, Swedish,...).



- a backlit LCD display with 4 lines for all other languages (e.g. Greek, Chinese, Korean, Polish,...).



Whether a display is translated or not depends on the operating mode.

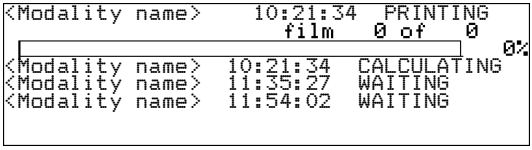
Contact Agfa for the latest Drystar 4500 language availability status.

Operator mode

In **operator mode**, appropriate information is displayed, in accordance with the status of the printer.

- The operator basic screen looks as follows, indicating that the Drystar 4500 is ready for operation and that no job is currently being executed.

- During printing, calculation and other processes, as the printer is busy with at least one job, the 'Print queue' screen is displayed:



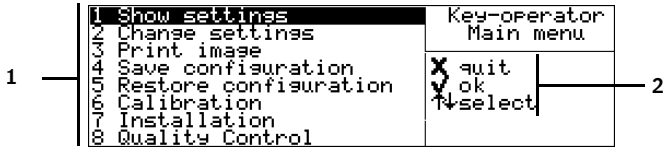
- The **progress indicator** keeps the user informed of the progress of a process (e.g. calculation of a bitmap, printing of a film, copying files). The line is gradually filled from left to right, from 0% to 100% as the process proceeds.

On the 'print queue' screen the modality name defined during installation will be used to refer to the corresponding modality. In case there is also a nickname (daily used name) defined during installation, the nickname is preferred to the modality name.

Refer to *'Overview of operator functions'* on page 30.

Key-operator mode

In **key-operator mode**, operation is menu driven. The menu displays the key-operator functions and the active keys.



1	Key-operator main menu functions
2	Active keys

Data entry

When entering numerical or alphanumerical data, always adhere to the following principles:

- Only (alpha)numerical data can be entered.
- During the data entry, the field is displayed in reverse mode.
- Increment the number in a(n) (alpha)numerical entry field by pressing the Up key. Transition from 9 to 0 of one figure will also increment the next figure to the left, respecting the valid limits of the range.
- Decrement the number in a(n) (alpha)numerical entry field by pressing the Down key. Transition from 0 to 9 of one figure will also decrement the next figure to the left, respecting the valid limits of the range.
- Move the entry position in a(n) (alpha)numerical entry field from right to left by pressing the Left key.
- Move the entry position in a(n) (alpha)numerical entry field from left to right by pressing the Right key.
- Press and hold down a key to repeat arrow key actions.
- To accept an entry in a menu, press the Confirm key.
- A short beep acknowledges and terminates the entry.

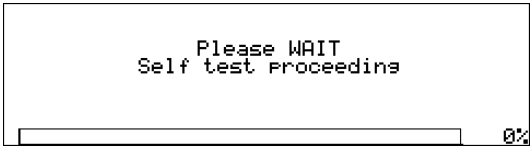
Switching on the Drystar 4500

Before switching on the Drystar 4500, read the safety instructions. Refer to *'Security precautions' on page 12*.

Follow the procedure below to ensure proper start-up of the Drystar 4500 and to check that everything is working correctly.

1 Check that the power cord is plugged in and then switch on the printer by pressing the **Power/Reset** button.

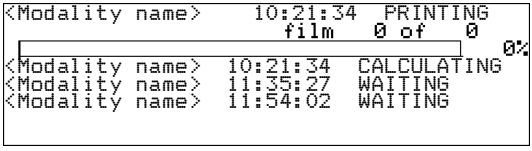
On the display, the following message is displayed. After a short while, a progress indicator will show the proceeding of the self test.



2 The printer is ready for operation:

- If, on the front panel display, the READY message is shown, *the status indicator LED is constant green*.

- If, on the front panel display, the 'Print queue' screen is shown, *the status indicator LED is green and blinking*.



3 Make sure that the printer is loaded with appropriate consumables.

Refer to 'Loading films' on page 41 for detailed information on loading films.

If the job status holds a warning or error indication, refer to 'Troubleshooting checklists' on page 67.

Switching off the Drystar 4500

When you want to switch off the printer, it is recommended to follow the procedure as described below, to make sure that any pending jobs are correctly finished.

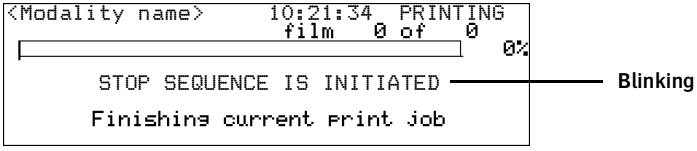
Do NOT press the Power/Reset button without first pressing the Stop button when the Drystar 4500 is busy printing a film.

Do NOT open the printer or an input tray before performing this procedure.

1 Press the **Stop** button to initiate the stop sequence.

The printer will finish a print job if it is already activated. Other jobs, currently being calculated or in waiting status will not be printed.

The display shows the progress of the print job, acknowledging that the stop sequence has been initiated:



2 Wait until the following screen is displayed:

3 Press the **Power/Reset** button to switch off the Drystar 4500.

Chapter 2

Basic operation (operator mode)

This chapter will inform on how to manage the print queue, how to print films with priority and how to load new films.

Overview of operator functions

This section focuses on the basic operating principles of the Drystar 4500. After reading this chapter, the operator should be able to produce diagnostic usable hard copies. No special technical skills are required.

All basic operator functions can be activated directly by pressing a single key on the keypad.

Function / Task	Description	Page
'Managing the print queue'	Jobs that have been received are put in a print queue, waiting to be printed.	31
'Assigning emergency priority'	To rearrange the order in which jobs are waiting to be printed. Jobs that have emergency priority are placed on top of the print queue.	33
'Loading films'	Instructions for loading new films on the printer.	41

In general, there is a time-out of ten minutes for operator response. When the time-out expires, the menu is closed.

Managing the print queue

You can always check the status of the print jobs.

As long as the jobs are not yet submitted for printing (i.e. they are still in the 'waiting' status), you can assign emergency priority and delete individual print jobs.

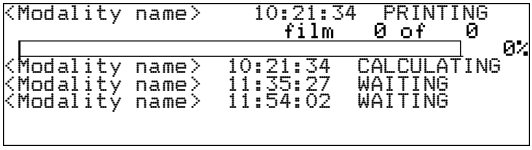
Keep in mind that one print job can hold several films to be printed. In accordance with the acquisition modality used, and with the actual settings, films can be grouped in a folder to be submitted as one print job for the Drystar 4500. Refer to the User manual of the acquisition modality for more information.

Checking the print queue

If jobs have been transmitted from the network to the Drystar 4500, they are put in the print queue on a first in, first out schedule. New jobs that are added to the queue get the 'waiting' status.

As soon as the last film of a job is ejected in the output tray, the next job that has been calculated will be put in printing status.

Example of the 'Print queue' screen:



- The first line shows information on the job that is currently being printed: modality name or nickname (if defined), time of receipt of the job and the job status.
- The second line shows how many films are to be printed for the current job, and also what film from that total is currently being printed.
- On the third line you can watch the progress of the printing process. The progress indicator is gradually filled from left to right, from 0% to 100% as the process is completed. If no job is being printed, the progress indicator will show the proceeding of the calculation process of the next job.

The other lines give information on the jobs that are still waiting in the print queue. A description of the possible status of each job is listed in the table below:

Status	Description	Action
Printing	Printing of this job is in progress.	Wait.
Calculating	The necessary calculations are being made before printing of the job can be started.	
Waiting	The job has been put in the print queue, but no processing is being done yet.	Wait. • To put emergency jobs on top of the queue, refer to *'Assigning emergency priority'* on page 33.

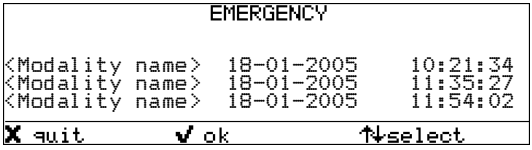
If the job status holds a warning or error indication, refer to 'Error messages while the printer starts up' on page 189.

Assigning emergency priority

You can assign emergency priority to jobs that need to be printed with urgency. Jobs that are marked for priority handling are placed at the top of the print queue for immediate processing. Emergency jobs will be printed before other jobs that were received previously. However, any pending jobs that are already being calculated or scheduled for printing will be finished first.

1 On the keypad, press the Emergency key.

The 'Emergency printing' screen is displayed:



Only the jobs that have the 'waiting' status are displayed. Print jobs which already have an emergency status are blinking.

You can press the Escape key to return to the previous menu without making changes in the job order ('Quit').

2 Press the Down and Up keys to scroll through the jobs and press the Confirm key to select the job that must be printed with emergency priority.

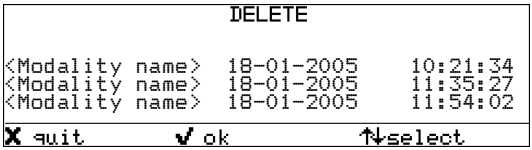
Printing will be resumed in accordance with the changed queue order.

Deleting print jobs

You can remove jobs from the print queue if they are in the 'waiting status'. However, any pending jobs that are already being calculated or scheduled for printing will be finished. Those jobs can not be deleted.

1 On the keypad, press the Delete key.

The 'Delete print job' screen is displayed:

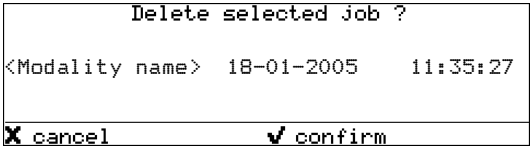


Only the jobs that have the 'waiting' status are displayed

You can press the Escape key to return to the previous screen without deleting print jobs ('Quit').

2 Press the Down and Up keys to scroll through the jobs and press the Confirm key to select the job that must be deleted.

The 'Confirm delete' screen is displayed.



You can press the Escape key to return to the previous screen without deleting print jobs ('Cancel').

3 Press the Confirm key to delete the print job.

Printing will be resumed with the next job. The job that has been deleted will not be printed.

About Drystar 4500 consumables

The Drystar 4500 can handle blue-transparent and clear-transparent films.

Available film formats are 8x10” or 10x12”.

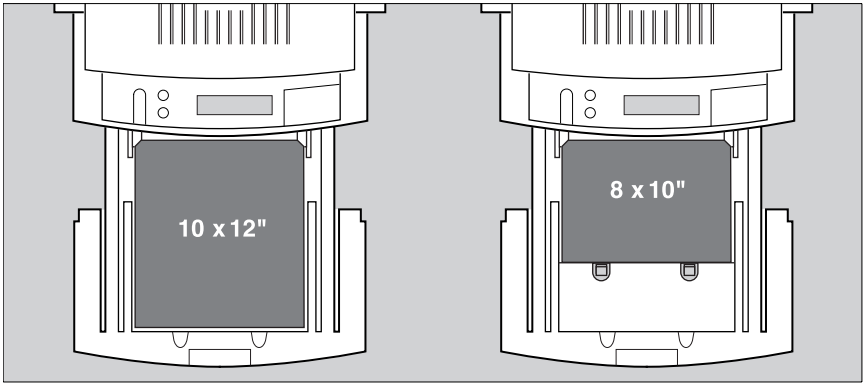
The printer has 2 input trays. The upper input tray always uses 8x10” films and the lower input tray can use either 8x10” or 10x12” films.

The key-operator can adjust the film size setting for the lower input tray (either 8x10” or 10x12”). Refer to *‘Changing the film format of the lower tray’* on page 162 of the Drystar 4500 Reference manual.

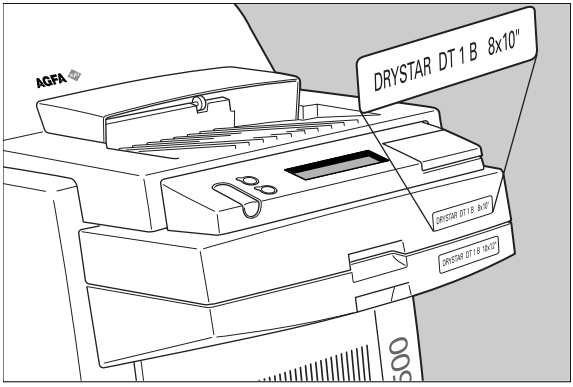
Labeling the input trays

The Drystar 4500 uses following films:

	Format
Upper input tray	8x10” either blue based (DT 1 B) as clear based (DT 1 C)
Lower input tray	8x10” or 10x12” either blue based (DT 1 B) as clear based (DT 1 C)

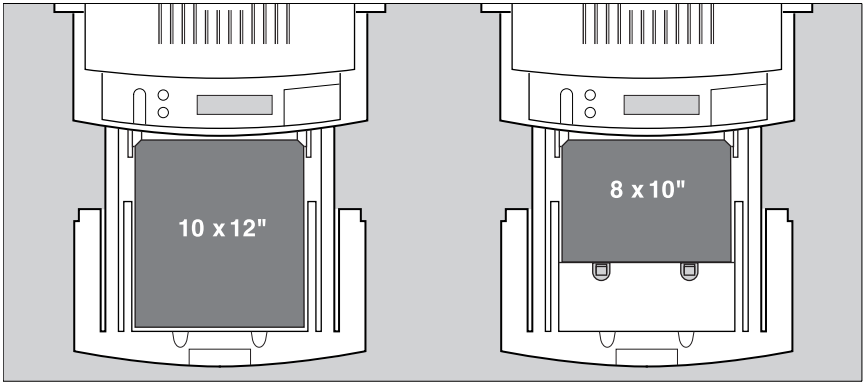


Appropriate labels have been applied on the film trays by the service personnel, indicating the type of new film to be loaded when the tray is empty.



Changing the film format of the lower tray

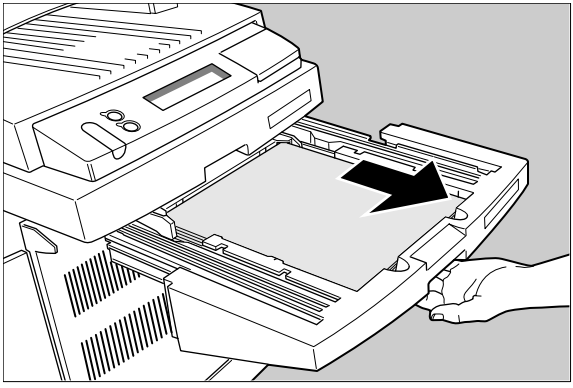
The key-operator can adjust the film size setting for the lower input tray (either 8x10” or 10x12”).



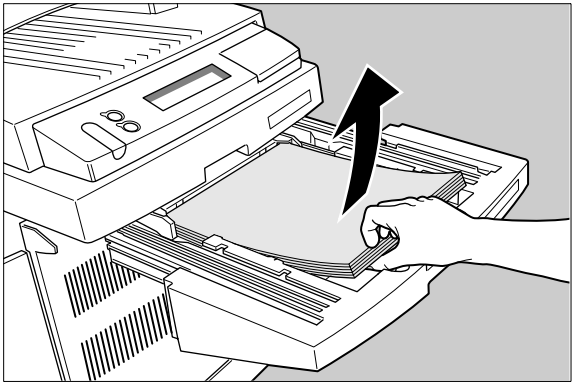
First, the key-operator has to perform a mechanical modification. After this modification, the ‘film format’ parameter has to be adjusted in the Change settings screen. Refer to *‘Changing the film format of the lower tray’* on page 67 of the Drystar 4500 Reference manual.

Proceed as follows to perform the mechanical modification:

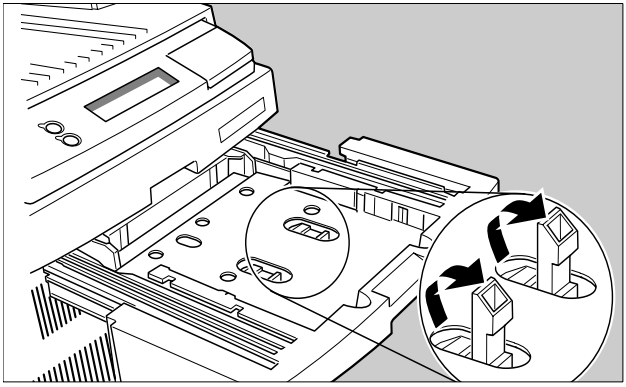
1 Open the lower input tray completely to make the tray accessible.



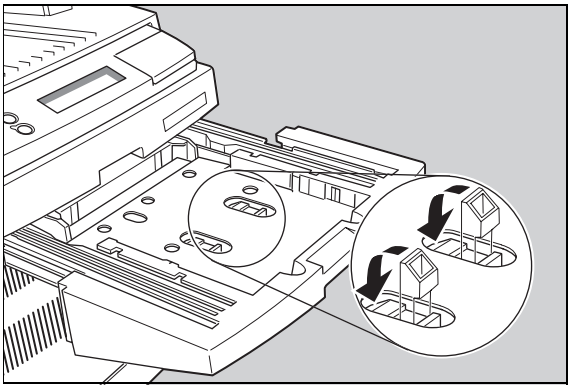
2 Remove any remaining film sheets.



3 To adjust the film format from 10x12" to 8x10", pull out the partition clips and put them upright.



4 To adjust the film format from 8x10” to 10x12”, push the partition clips down.



5 Adjust the ‘film format’ parameters in the Change setting screen. Refer to *‘Changing the film format of the lower tray’* on page 67 of the Drystar 4500 Reference manual.

Loading films

Introduction

This section describes how to load the Drystar 4500 with appropriate films.

The Drystar 4500 can be loaded with both 8x10" and 10x12" films.

The Drystar 4500 can be loaded with new films in full daylight. Loading films is easy and can be done in no time. Follow the procedures as described in this section.

The Drystar 4500 will inform you in several ways that an input tray is empty:

- An audible signal,
- the Status indicator LED is flashing (red color),
- the display screen shows a message informing you that either the upper or lower input tray is empty.

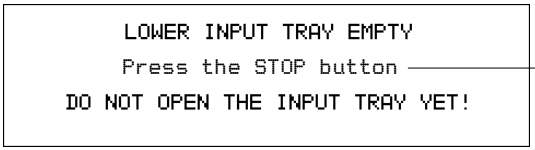
Do NOT open the input tray when the display message says so!

In the procedure, we will assume that the lower input tray is to be loaded. Except for the fact that you can not change the film format, the procedure for the upper input tray is identical.

The procedure is slightly different, depending on the fact wether the Drystar 4500 is printing/calculating or in the ready state. When the printer is printing/calculating, refer to 'When the Drystar 4500 is printing or calculating:' on page 42, otherwise, refer to 'Film loading procedure:' on page 43.

When the Drystar 4500 is printing or calculating:

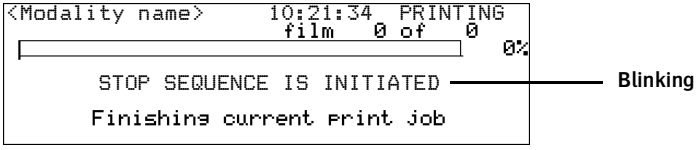
1 The display shows the following message:



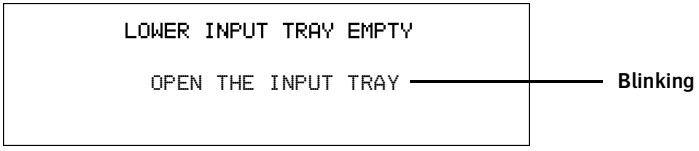
Do NOT press the Power/Reset button without first pressing the Stop button when the Drystar 4500 is busy printing a film

2 Press the **Stop button** to initiate the stop sequence.

3 Wait while the printer is finishing printing any current jobs.



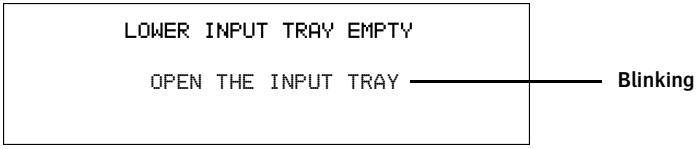
The printer is ready when the following message appears:



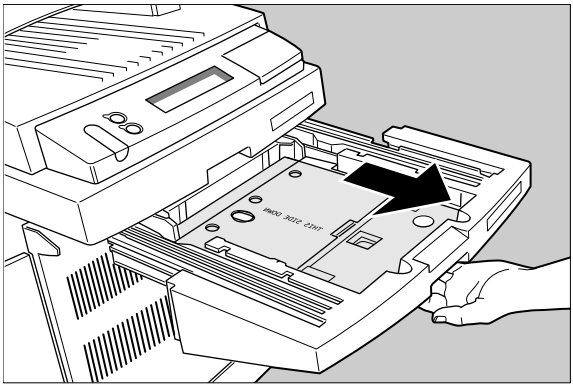
4 Proceed with the *'Film loading procedure:'* on page 43.

Film loading procedure:

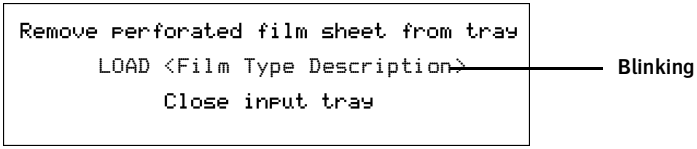
1 The printer is ready to be loaded with new films when the following message appears:

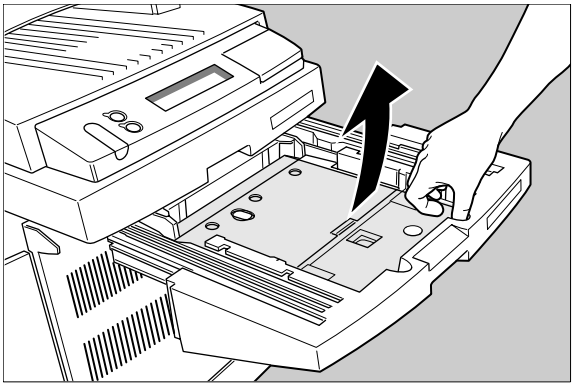


2 Open the empty input tray completely to make the tray accessible.



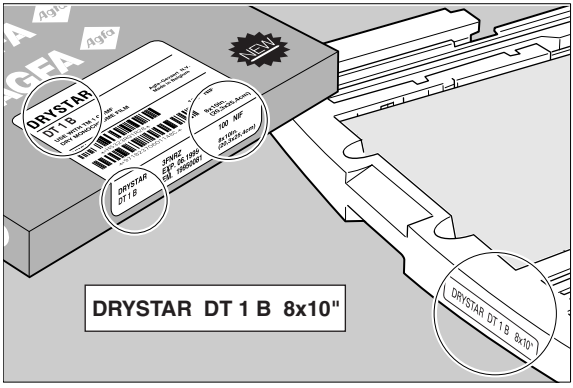
3 Remove the perforated protective sheet from the input tray.





4 Open a film pack, making sure that the film type corresponds with both:

- The film type description on the display (refer to the screen above).
- The film type as indicated on the label on the film tray.



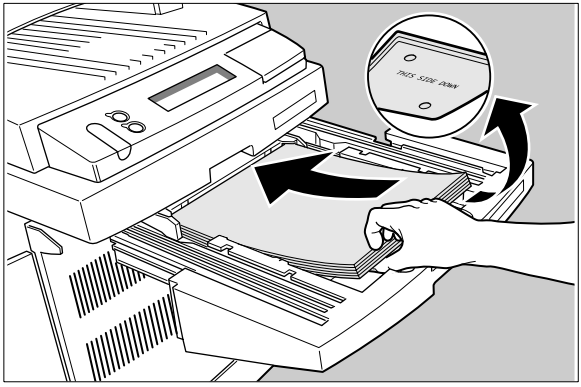
You can find the film type on the film packaging. The label may show some additional characters after the film type, e.g. 'DRYSTAR DT 1 C'. Those characters are not relevant for the printer settings, and you can ignore them.

When you have to load a film of another type, you will have to change the film type settings first. 'Changing the configuration settings' on page 56 of the Drystar 4500 Reference manual.

5 Remove the plastic bag with the film pack from the film box.

6 Open the plastic bag and take the film pack.

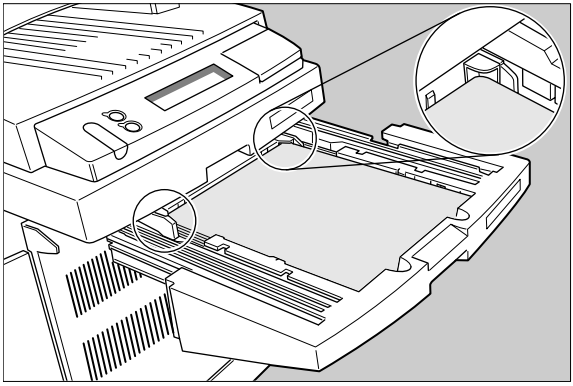
7 Place the new film pack in the film tray.



Make sure that the sheet labeled "This side down" is at the bottom of the film pack when it is loaded.

Make sure not to load more than one film pack in an input tray. Loading more than one film pack in an input tray may damage the Drystar 4500.

8 Verify that the film pack is kept in place under the two retainers.



9 Close the input tray.

The Drystar 4500 resumes printing as soon as the tray is closed.

Chapter 3

Advanced operation (key-operator mode)

This chapter gives an overview of functions for the advanced user:

- Overview of key-operator functions
- Quality Control
- Preventive maintenance schedule
- Cleaning the exterior
- Cleaning the cooling air flow holes
- Print head cleaning
- Troubleshooting checklists

Overview of key-operator functions

The key-operator menus make it possible to use the Drystar 4500 advanced functions.

These functions are described in detail in the Drystar 4500 Reference manual.

For general information on the functions of the keys on the Drystar 4500, refer to *'The user interface'* on page 19.

Overview

The Drystar 4500 features the following functions on the main menu level of the key-operator mode:

Menu item	Function	Page (Ref. Man.)
Show settings	To consult the current settings of the printer.	49
Change settings	To change the current settings of the printer.	56
Print image	To print one of the standard Drystar 4500 test images. To load and print images from a floppy disk.	93
Save configuration	To make a back-up of the printer settings.	99
Restore configuration	To restore the back-up of the printer settings.	101
Calibration	To maintain optimal image quality.	105
Installation	To install the software with the installation wizard.	113
Quality control	To control with a daily procedure the image quality.	(User Man.) 49

Refer to the indicated page of the Drystar 4500 Reference manual for an explanation of the function and the appropriate procedures.

Quality Control

In order to establish and maintain consistent image quality, a regular evaluation of the image quality is advised.

The Drystar 4500 contains an automatic QC feature that has been designed to comply with the grayscale reproduction constancy test, according to the international standard IEC 1223-2-4.

Local Regulations may require other procedures.

The Drystar 4500 QC procedure consists of two main steps:

- Before initial use, establishing a number of reference values that will be used for further follow-up and verifying initial image quality.
  Refer to *'Establishing the reference values and verifying image quality'* on page 50.
- After establishing these values, performing regular daily, weekly and annual quality tests.
  Refer to *'Performing quality control (QC) tests'* on page 57.

The results of these tests are recorded on Quality Control Charts.

The QC image (Refer to *'QC test image'* on page 54) has several additional fields where the QC data can be filled in. This image should be filed as part of the QC procedure.

For more information, please refer to *'Quality Control Charts'* on page 77.

Establishing the reference values and verifying image quality

After installation of a new Drystar 4500 and before initial use you must establish Quality Control aim values. These values will be used as the base line for comparison when daily Quality Control is done. These values should be determined again after major service, repair or software update.

The following Quality Control aim values must be determined:

- The daily operating density levels. Refer to *'Establishing the daily operating reference density levels'* on page 51.
- Drystar 4500 image geometry. Refer to *'Establishing the image geometry reference values'* on page 54.

Once Quality Control aim values are established you must evaluate the Spatial Resolution, the Artifact Levels and the Low Contrast Visibility to determine if the image quality is acceptable. Refer to *'Verifying Acceptable Spatial Resolution, Artifact Levels and Low Contrast Visibility'* on page 56.

The Quality Control aim values, the Spatial Resolution and Artifact Levels and the Image Geometry values are all recorded on the Quality Control charts. Refer to *'Quality Control Charts'* on page 77.

On these charts, the following test conditions are also recorded:

- The type and serial number of the Drystar 4500.
- The type and emulsion number of the film used to determine the reference values.
- The type of densitometer used.
- The time (day, month, year) that the values were established.

Before you can establish the daily operating levels, the Drystar 4500 must be switched on for at least 15 minutes and it must be calibrated as well.

Refer to *'Switching on the Drystar 4500'* **on page 26** **and** *'Performing the calibration procedures'* **on page 105** **of the Drystar 4500 Reference manual.**

Establishing the daily operating reference density levels

This procedure enables you to establish the base line values for:

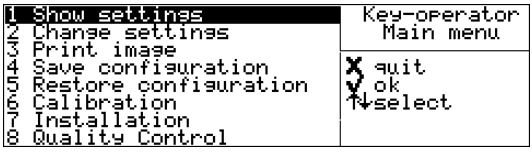
- Low density
- Mid density
- High density

The densitometer of the Drystar 4500 is calibrated at installation. Authorized service personnel should recalibrate the densitometer annually or after major service or repair.

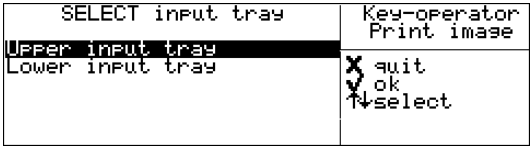
To establish the daily operating levels, proceed as follows:

1 Press the Key-operator key to enter the Key-operator mode.

2 Press the Down key seven times, followed by the Confirm key to select 'QC'.



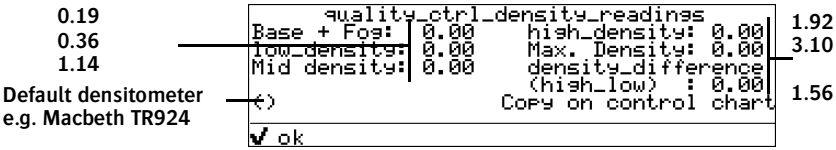
The 'Select input tray' screen appears:



3 Press the Up/Down arrow keys to select the proper input tray, followed by the Confirm key.

The Drystar 4500 will automatically print the QC Test image.

4 After the image is printed, the system will display the optical density values:



The displayed values represent the following steps on the test film:

Operating Level		Value (Macbeth units) (according IEC 1223-2-4 or better)
Low density	the density value of the Low density step	0.4 ± 0.05
Mid density	the density value of the Mid density step	1.2 ± 0.15
High density	the density value of the High density step	2.0 ± 0.20

If the mid density value does not meet or exceeds the recommended values, the cause must be found and the problem solved before any further clinical films can be printed.

Refer to *'Maintaining image quality and resolving image quality problems'* on page 191 of the Drystar 4500 Reference manual and *'Preventive maintenance schedule'* on page 61, or call your local Agfa service organization.

5 Record the density levels on the Drystar 4500 Chart 1 ('Determination of the operating levels'). Refer to *'Quality Control Charts'* on page 77.

6 Press the Confirm key to return to the main menu.

7 Repeat steps 1 through 6 once a day for five consecutive days, as indicated on the Drystar 4500 Chart 1.

8 Calculate the average value of the densities from the five images. These values represent operating levels or aim values, for each density.

9 Record the respective aim (average) values as the 'Operating levels' on the Drystar 4500 Charts 2a and 2b ('daily Drystar 4500 control chart'). Refer to *'Quality Control Charts'* on page 77.

The calculated 'Operating levels' should be as follows:

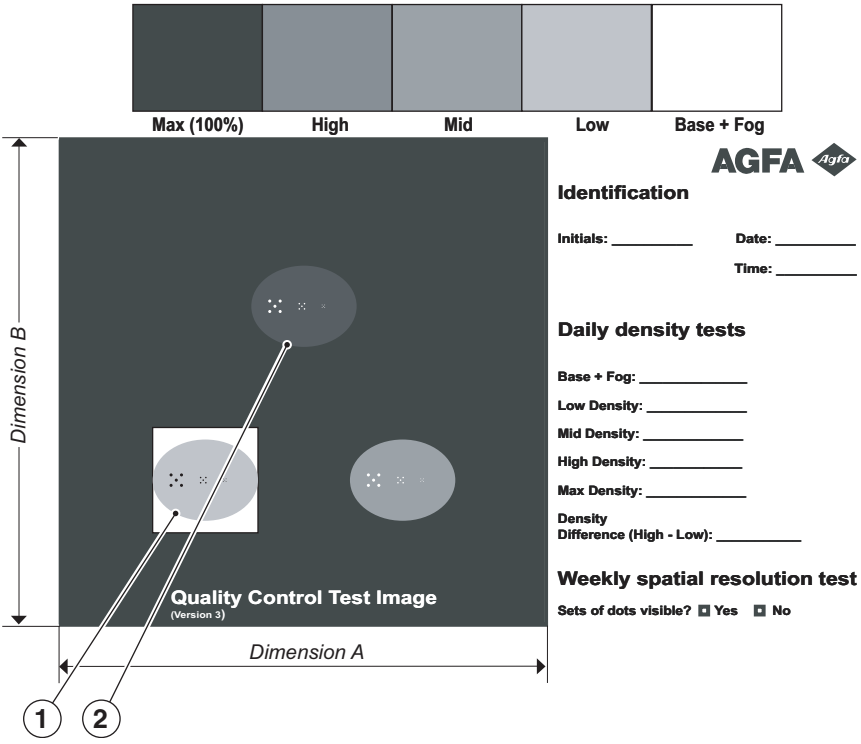
Operating Level	Value (Macbeth units) (according IEC 1223-2-4 or better)
Low density	0.4 ± 0.05
Mid density	1.2 ± 0.15
High density	2.0 ± 0.20

10 These charts will be used for the daily quality test. For more information, refer to *'Performing the daily QC test'* on page 57.

Establishing the image geometry reference values

To establish the image geometry reference values, proceed as follows:

1 Print the QC test image or use the previously printed test image.
You should obtain an image looking like this (without the dimensions A and B):
QC test image



2 To determine the reference values for geometry, measure the distances A and B of the geometric square on the test image.

Make sure to measure distance A from the left edge of the left line to the right edge of the right line and distance B from the upper edge of the upper line to the lower edge of the lower line.

We strongly recommend using a 30 cm (12 inch) machinist scale with 0.5 mm divisions (1/64 inch).

3 Record these values as reference dimensions A ref and B ref on the Drystar 4500 Chart 4 ('Drystar 4500 Geometric Consistency Control Chart'). Refer to *'Quality Control Charts'* on page 77.

These charts will be used for the annual quality test. For more information, refer to *'Performing the Annual QC tests'* on page 60.

4 Save this film for future reference.

Verifying Acceptable Spatial Resolution, Artifact Levels and Low Contrast Visibility

Good viewing conditions are important for the correct interpretation of both diagnostic and test images. Make sure that the lightbox intensity (luminance) is between 2000 and 4000 cd/m² (4500 and 6500 °K). Use a magnifying glass and use shutters to collimate. Make sure the ambient light is low.

To verify acceptable spatial resolution, artifact levels and low contrast visibility, proceed as follows:

1. Print the QC Test image or use the previously printed QC Test image used to establish the daily operating density levels.

2. Visually check the QC test image for artifacts: no significant disturbing artifacts should be visible.

3. Check the spatial resolution in each of the three ovals. Within each oval there are three groups, each having five dots. All five dots of each group must be visible with a magnifying glass. The smallest cluster of 5 dots is only visible if the viewing conditions are good.

4. Check the Low Contrast Visibility at both the high (100 / 95%) and low end (0 / 5%) of the density scale. You should be able to see the circle in the square (refer to item 1 on the *'QC test image'* on page 54) and the upper circle (refer to item 2 on the *'QC test image'* on page 54).

5. Record these values at the top of the Drystar 4500 Chart 3 (Drystar 4500 Artifacts and Spatial Resolution Control Chart). Refer to *'Quality Control Charts'* on page 77.

6. These charts will be used for the weekly quality test. For more information, refer to *'Performing the Weekly QC tests'* on page 59.

In case of significant artifacts or insufficient spatial resolution, the cause must be found and the problem solved before any further clinical films can be printed.

Refer to *'Maintaining image quality and resolving image quality problems'* on page 191 of the Drystar 4500 Reference manual and *'Preventive maintenance schedule'* on page 61, or call your local Agfa service organization.

Performing quality control (QC) tests

The following procedures must be performed daily, weekly or annually as indicated.

The reason for performing quality control tests is to determine if any significant image quality variation or deterioration has occurred which may require corrective action. Comparing the results of the tests with the reference values previously established does this.

This procedure allows the operator to take the necessary preventive actions before any image quality loss can take place.

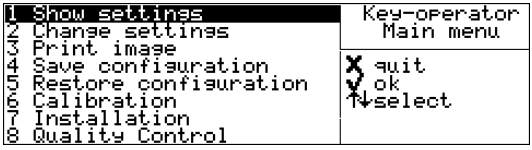
Performing the daily QC test

This test must be performed every day before any clinical film can be processed.

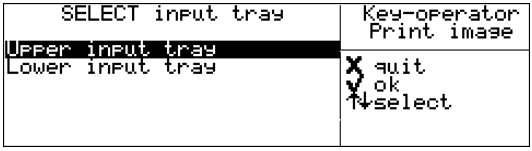
1 Turn on the Drystar 4500 and wait at least for 15 minutes. Refer to *'Switching on the Drystar 4500'* on page 26.

2 Press the Key-operator key to enter the Key-operator mode.

3 Press the Down key seven times, followed by the Confirm key to select 'QC'.



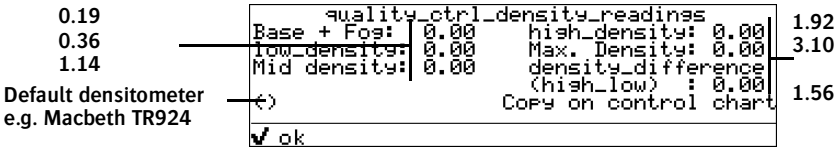
The 'Select input tray' screen appears:



4 Press the Up/Down arrow keys to select the proper input tray, followed by the Confirm key.

The Drystar 4500 will automatically print the QC Test image.

5 After the image is printed, the system will display the optical density values:



6 Record the low, mid and high density values on the Drystar 4500 Charts 2A and 2B (Drystar 4500 Daily Density Control Chart'). Also record the date and time of the test on the charts and on the QC test images. Refer to *'Quality Control Charts'* on page 77.

7 Press the Confirm key to return to the main menu.

In case the measure results are not within the aim values, the reason for the unacceptable density variations must be identified and resolved before any further clinical films can be processed. This may include repeating the film calibration procedure.

For possible causes of non-compliance and the respective actions, refer to *'Maintaining image quality and resolving image quality problems'* **on page 191** **of the Drystar 4500 Reference manual and** *'Preventive maintenance schedule'* **on page 61****.**

Performing the Weekly QC tests

Spatial Resolution, Artifact Test and Low Contrast Visibility

To identify artifacts and verify spatial resolution you must perform the following test weekly or as needed for troubleshooting image quality problems.

Good viewing conditions are important for the correct interpretation of both diagnostic and test images. Make sure that the lightbox intensity (luminance) is between 2000 and 4000 cd/m² (4500 and 6500 °K). Use a magnifying glass and use shutters to collimate. Make sure the ambient light is low.

1 First, print out the QC test image. Refer to *'Performing the daily QC test'* on page 57.

2 Check the QC test image visually for artifacts: no significant disturbing artifacts should be visible.

3 Check the spatial resolution.

The test film also shows three squares which each contains an oval. These 3 ovals contain 3 groups, each having 5 dots. All five dots of each group must be visible with a magnifying glass. The smallest cluster of 5 dots is only visible if the viewing conditions are good.

4 Check the Low Contrast Visibility at both the high (100 / 95%) and low end (0 / 5%) of the density scale. You should be able to see the circle in the square (refer to item 1 on the *'QC test image'* on page 54) and the upper circle (refer to item 2 on the *'QC test image'* on page 54).

5 Record these values on the Drystar 4500 Chart 3 (Drystar 4500 Artifacts and Spatial Resolution Control Chart).

In case of significant artifacts, insufficient spatial resolution or failure of any other recommended QC tests, the cause of the problem must be identified, and corrective action must be taken before the Drystar 4500 can be used for any further clinical imaging.

Refer to *'Maintaining image quality and resolving image quality problems'* on page 191 of the Drystar 4500 Reference manual and *'Preventive maintenance schedule'* on page 61, or call your local Agfa service organization for assistance.

Performing the Annual QC tests

Geometric Consistency Test

To be able to notice fluctuations in image size and aspect ratio, you must perform this procedure once a year.

1 First, perform the daily test.

2 Measure the distances A and B of the geometric square on the QC test image. Refer to *'Establishing the image geometry reference values'* on page 54.

Make sure to measure distance A from the left edge of the left line to the right edge of the right line and distance B from the upper edge of the upper line to the lower edge of the lower line.

We strongly recommend using a 30 cm (12 inch) machinist scale with 0.5 mm divisions (1/64 inch).

3 Record these values as measured distances A and B on Chart 4 ('Drystar 4500 Geometric Consistency Control Chart').

4 Compare the measured A and B dimensions with the reference dimension values, A ref and B ref on the Drystar 4500 Chart 4 ('Drystar 4500 Geometric Consistency Control Chart').

The differences between the measured dimensions of A and B and the reference values A ref and B ref should be less than or equal to 1.0%.

5 Check for image distortion.

6 Calculate the aspect ratio by dividing A by B.

The result must be 1 +/- 0.01

If the image size or distortion values exceeds the limits, contact Agfa service to resolve the problem.

Preventive maintenance schedule

The Drystar 4500 is designed for trouble-free service. Maintenance and cleaning involve only some minor user tasks.

Interval	What to do?	Page
Ad hoc.	*'Cleaning the exterior'*	62
Each 6 months (or more if required).	*'Cleaning the cooling air flow holes'*	63
Ad hoc.	*'Print head cleaning'*	64
When image quality tends to degrade.	Refer to *'Print head profile calibration'* of the Drystar 4500 Reference manual.	(Ref. man.) 111

Safety guidelines

To prevent damage to the printer while performing maintenance, observe the following safety precautions:

- Do not lubricate the printer.
- Do not attempt to disassemble the printer.
- Do not touch the resistor line of the print head.
- Always switch off the Drystar 4500 and disconnect the power cord from the outlet before carrying out any maintenance work inside the printer.

Film jam removal or cleaning the printer head can be done without switching the power off. Nevertheless, care should be taken and the 'Safety precautions' on page 9 should be respected.

Cleaning the exterior

1 Switch off the Drystar 4500 by following the procedure as described in *'Switching off the Drystar 4500'* on page 28.

2 Remove the power plug from the socket.

3 Remove the network cable.

4 Wipe the exterior of the printer with a clean, soft, damp cloth.

Use a mild soap or detergent if required but never use an ammonia-based cleaner. Be careful not to get any liquid in the power cord port.

5 Plug in the printer and switch it on by following the procedure as described in *'Switching on the Drystar 4500'* on page 26.

Cleaning the cooling air flow holes

1 Switch off the Drystar 4500 by following the procedure as described in *'Switching off the Drystar 4500'* on page 28.

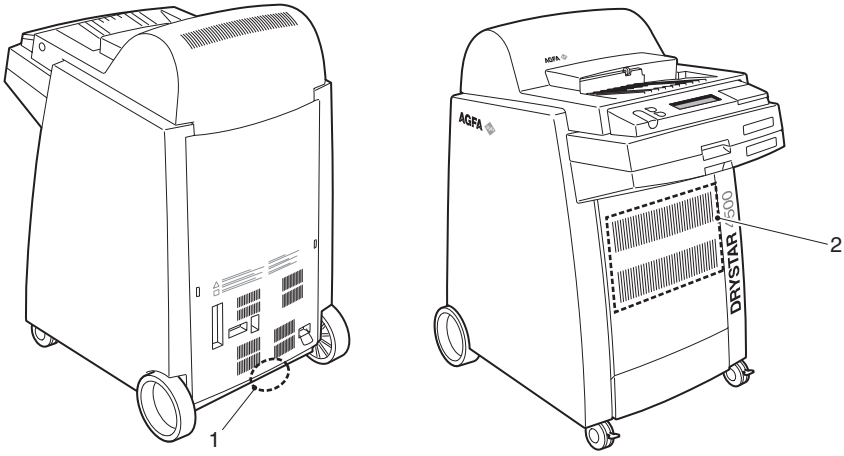
2 Remove the power plug from the socket.

3 Remove the network cable.

4 Push the release button of the backpanel. The button is situated in the zone represented by item 1 on the drawing below.

5 Remove the back panel.

6 With a vacuum cleaner, clean the cooling air flow holes on the front (item 2 on the drawing below) and especially the CPU/power supply area at the rear of the printer.



7 Re-install the backpanel.

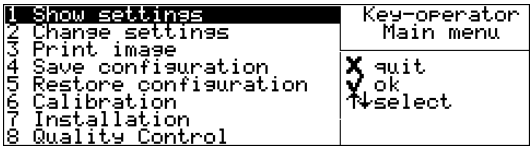
8 Plug in the printer and switch it on by following the procedure as described in *'Switching on the Drystar 4500'* on page 26.

Print head cleaning

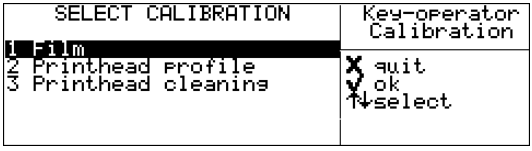
Print head cleaning must be done when image quality problems occur. For more information on maintaining image quality, refer to *'Maintaining image quality and resolving image quality problems'* on page 191 of the Drystar 4500 Reference manual.

1 Press the Key-operator key to enter the Key-operator mode.

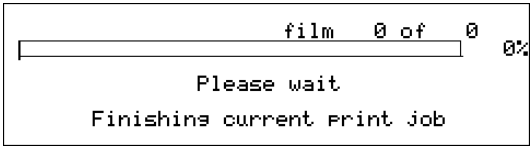
2 Press the Down key five times, followed by the Confirm key to select 'Calibration'.



The 'Select Calibration' screen appears:

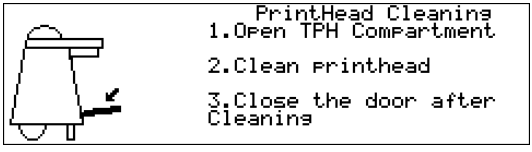


In case the printer is in printing mode, a screen will be presented that the calibration cannot be done now, but has to be reactivated later.

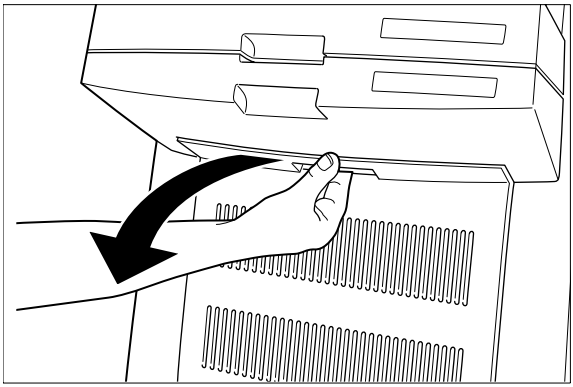


3 Press the Down key two times to select 'Print head cleaning' and press the Confirm key. The printer will automatically shut down.

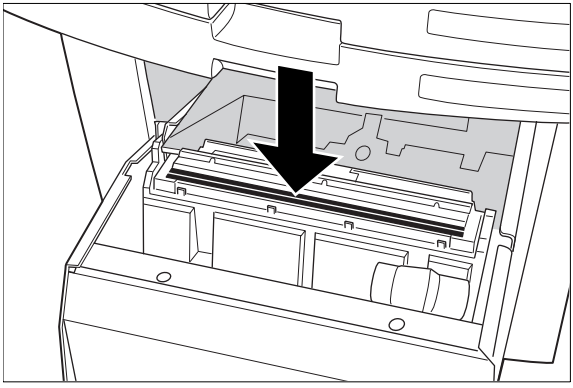
4 The 'Print head cleaning' screen will give instructions on what to do:



5 Open the front cover by pulling its handle.

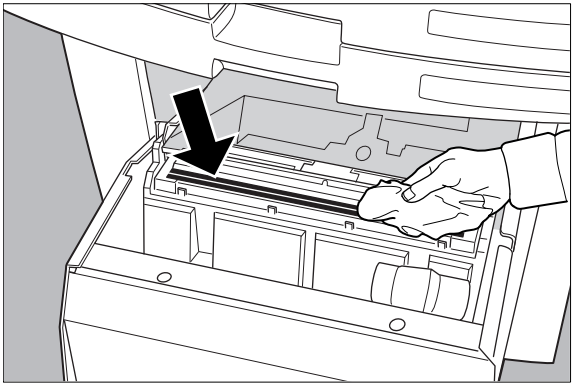


6 Locate and check on sight the print head resistor line.



Be careful not to touch the print head resistor line.

7 Clean the print head resistor line.



Gently pass over the resistor line a few times with a lint free cloth slightly moistened with Isopropyl alcohol or Ethanol. **Do this in only one direction, i.e. from left to right, without lifting the cloth**.

Do not apply any pressure on the print head because this pressure may cause damage on the interconnections underneath the print head.

8 Close the front cover.

9 After you have cleaned the print head resistor line and closed the door, the printer will continue.

Troubleshooting checklists

The table below lists some general problems which can occur when working with the Drystar 4500.

Refer to the appropriate pages of the Drystar 4500 Reference manual.

- The Drystar 4500 does not print.

Action	Refer to	(Ref. man.) Page
Check the Drystar 4500	*'The Drystar 4500 does not print'*	174
Remove a jammed film	*'Film input tray feed jams'*	178
	'Film transport jams (clearing from the front)'	181
	'Film transport jams (clearing from the top)'	182
	'Consumables wrongly inserted'	186
	'Unauthorized opening of the printer'	188
Resolve error messages	*'Checking error messages'*	174
Handle floppy disk error	*'Checking floppy disk error messages'*	176

- The quality of the printed images is bad (printing remains possible).

Action	Refer to	(Ref. man.) Page
Resolve film quality problems	*'Maintaining image quality and resolving image quality problems'*	191
	'White dots or lines appear in the transport direction'	193
	'Low frequency banding'	193
	'Scratches appear on film'	193
Resolve warning messages	*'Warning messages'*	194

Have electrical or mechanical defects repaired by skilled personnel only!

Appendix A

Equipment information sheet

Specifications

Product description	
Type of product	Printer
Commercial name	Drystar 4500
Original seller/manufacturer	Agfa-Gevaert N.V.
Labelling	
TÜV-, cULus-Certification Mark, CE-marking	
CCC Mark	
A#Sharp Mark	
Dimensions	
Dimensions (approx. values in cm)	• Unpacked: width 55, length 72, height 92 • Packed: width 70, length 88, height 130
Weight	• Unpacked: approx. 95 kg • Packed: approx. 125 kg
Hard disk capacity	> 4 GByte
RAM memory	128 Mb
Floppy disk container	Four 2HD 1.44 Mbyte floppy disks
Electrical connection	
Operating voltage	100-120 V; 220-240 V AC
Mains fuse protection	
220-240 V operation	16/15 A slow blow, max.
100-120 V operation	16/15 A slow blow, max.
Mains frequency	50/60 Hz

Network connectivity	
Ethernet / connectors	RJ45 twisted pair for 10/100Base-TX; Serial RS232 connection
Network protocols (TCP/IP services)	FTP, Telnet, HTTP, SNMP, SMTP, LPD, Helios
Image formats	DICOM (Default) TIFF
Postscript	Optional
Power consumption - heat dissipation	
During operation	350 W
In standby	140 W
Protection against	
Electrical shocks	Class 1 (grounded)
Ingress of water	IPXØ
Environmental conditions (operation)	
Room temperature	Between +15°C and +30°C
Relative humidity	Between 20% and 75% Note: Films may not become wet!
Atmospheric pressure	70 kPa - 106 kPa
Environmental storage conditions	
Climate conditions for storage are in accordance with EN60721-3-1-class 1K4.	
Room temperature	Between -25°C and 55°C (storage)
Relative humidity	Between 10% and 100%
Absolute humidity	Between 0.1 g/m^3 and 35 g/m^3
Rate of change of temperature	1°C/min
Atmospheric pressure	70 kPa - 106 kPa

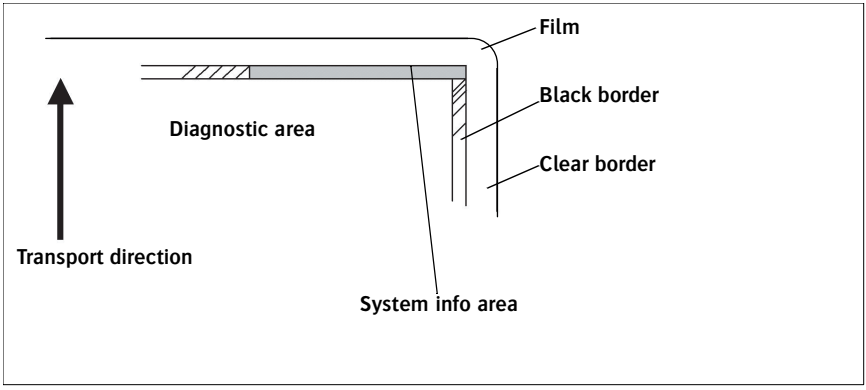
Environmental transport conditions	
	*Climate conditions for transport are in accordance with EN60721-3-2-class 2K4.*
Temperature	Between -40°C and 70°C (transport)
Relative humidity not combined with rapid temperature changes	95% at +45°C
Noise emission (method of measurement in accordance with DIN 45635 part 19)	
During operation	Max. 55 dBA
In standby	Max. 45 dBA
Consumables	
Drystar DT 1B and Drystar DT 1C	8x10” and 10x12” film sizes
Print technology	
Direct thermal printing	
Reliability	
Estimated product life (if regularly serviced and maintained according to Agfa instructions)	> 5 years and > 150,000 films
Service interventions	Max. 2 interventions / 3 years
Earthquake (standard)	Meets the CA requirements

Imaging Array - Diagnostic area				
Film size 8x10”	**8” dimensions in pixels**	**8” dimensions in mm**	**10” dimensions in pixels**	**10” dimensions in mm**
Diagnostic area	3728	186,4	4672	233,6
Film size 10x12”	**10” dimensions in pixels**	**10” dimensions in mm**	**12” dimensions in pixels**	**12” dimensions in mm**
Diagnostic area	4672	233,6	5760	288,0

Viewing the System info area on a film

On the top right corner of each film, a “System info” area will be printed.

This info can only be read using a magnifying glass.



The System info area contains info about:

- Printer: (serial number, densitometer info, film counts, software version, etc.),
- Controller (image source, date, time, etc.).

For more detailed information, refer to the Drystar 4500 Service documentation.

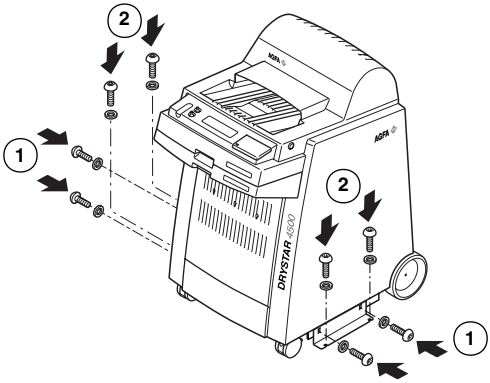
Options and accessories

Accessory

Mobile installation kit

The default installation kit allows you to use the Drystar 4500 in a van, or to use it in unstable environment.

Safe transportation is ensured by two fixation bars that lock the Drystar 4500 to its location (see illustration below). The fixation bars are included in the default installation kit.



For more information, refer to the "Unscrew the fixations" instructions of the Drystar 4500 Plug & Play Installation manual (document 2805F or 2805G).

Option

Postscript connectivity.

A Postscript software module can be installed as an option. No hardware modifications are required prior to the installation of the Postscript module.

Connectivity

Connectivity with Agfa equipment

- Connected via VIPS or CR QS
  - ADC Compact
  - ADC Compact Plus
  - ADC Solo
  - CR 25.0
  - CR 75.0
- ADR Thorax
- Impax
- MG3000
- Paxport
- MULTIFLEX

Connectivity with non-Agfa equipment

Drystar 4500 is a Dicom printer and can therefore be connected to all modalities supporting Dicom. Although, to ensure optimal operation and image quality, Agfa has made the effort to test and release the Drystar 4500 with most of the modalities on the market. For the complete list or if you want to check on a specific modality, contact your Agfa representative.

Appendix B

Quality Control Charts

Chart 1

Drystar 4500: Determination of Operating Levels

Imager Type: _____ Serial #: _____ Date _____

Film Type: _____ Emulsion #: _____

Densitometer Internal: _____ (default selection)

Step 1: Print QC Test images on five consecutive days. Record the optical densities measurements in the tables below. After five days, average the values to determine the operating (aim) levels for each of the parameters.

	Day 1	Day 2	Day 3	Day 4	Day 5
Month					
Day					
Initials					

Low Density					
Average of 5 Values = operating (aim) level "Low Density"					

Mid Density					
Average of 5 Values = operating (aim) level "Mid Density"					

High Density					
Average of 5 Values = operating (aim) level "High Density"					

Step 2: Copy the operating (aim) levels to Charts 2A/B ('Daily Density Control Chart')

Chart 2A

Drystar 4500 Daily Density Control Chart

Imager Type: _____ Serial #: _____ Film Type:_____ Emul #:_____

Densitometer Internal: _____ (default selection)

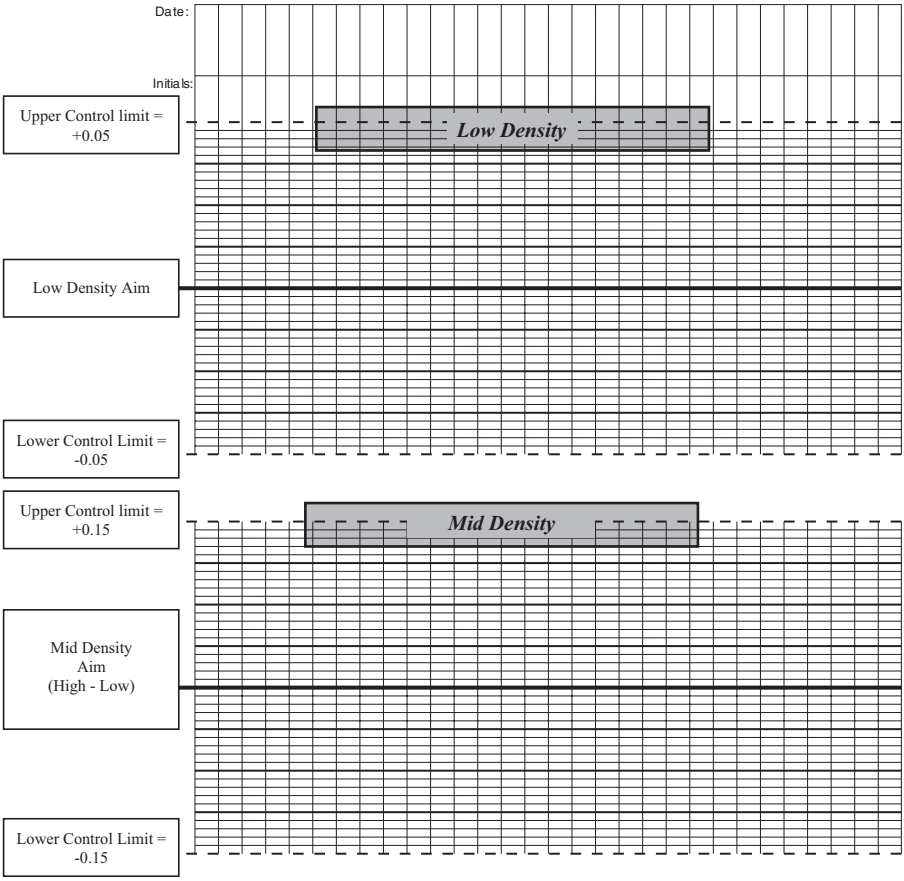


Chart 2B

Drystar 4500 Daily Density Control Chart

Imager Type: _____ Serial #: _____ Film Type:_____ Emul #:_____

Densitometer Internal: _____ (default selection)

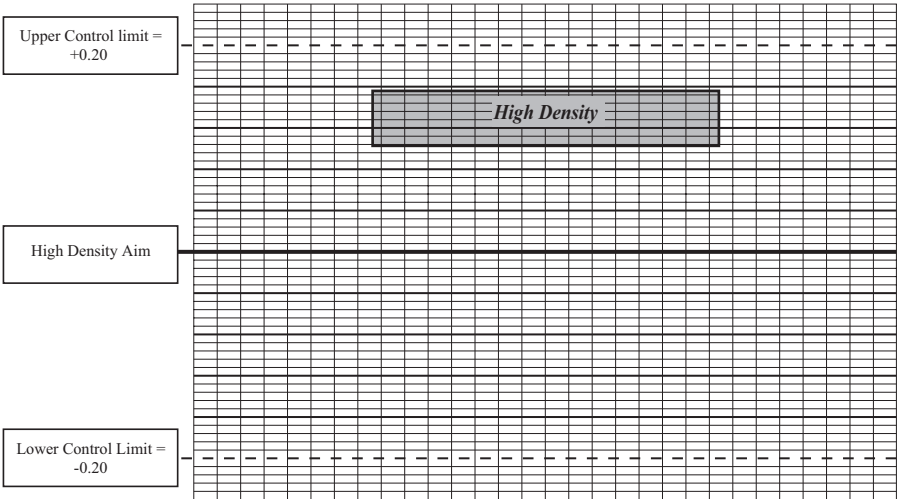


Chart 3

Drystar 4500 Artifacts and Spatial Resolution Control Chart

Test Frequency: Weekly Drystar 4500 Serial # _____________

Initial Reference Test Date	
Initial Reference Artifacts	
Initial Reference Dot Visibility	
Initial Reference Low Contrast	

Month					
Day					
Artifacts					
Visibility of all Dots					
Low Contrast Visibility					

Month					
Day					
Artifacts					
Visibility of all Dots					
Low Contrast Visibility					

Month					
Day					
Artifacts					
Visibility of all Dots					
Low Contrast Visibility					

Month					
Day					
Artifacts					
Visibility of all Dots					
Low Contrast Visibility					

Month					
Day					
Artifacts					
Visibility of all Dots					
Low Contrast Visibility					

Chart 4

Drystar 4500 Geometric Consistency Control Chart

Test Frequency: Annually or as required Drystar 4500 Serial # _____

Reference Dimensions Date:		Measured Dimensions Date:		Consistency		Aspect Ratio	
A_{ref}		A:		A/A_{ref}		A/B	
B_{ref}		B:		B/B_{ref}			

Reference Dimensions Date:		Measured Dimensions Date:		Consistency		Aspect Ratio	
A_{ref}		A:		A/A_{ref}		A/B	
B_{ref}		B:		B/B_{ref}			

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