



Dome® CXtra™

QUICK REFERENCE

Windows XP Professional
Windows 2000 Professional

www.planar.com

Dome® CXtra™ is a software solution that adds functionality to Planar medical imaging displays. Developed for Dome CX, Dome EX, Dome QX, and select Planar Desktop displays, the Dome CXtra software provides a common framework for consistent image quality and constant display maintenance. The Dome CXtra software provides these services:

- RightLight – Calibrates Dome CX and Dome EX displays automatically to conform with the DICOM curve; offers manual conformance testing and options for viewing conformance data. You can complete conformance tests when you install the optional Planar LCD photometer.
- DICal – Allows you to calibrate Dome QX and select Planar Desktop displays manually to conform with the DICOM curve; offers manual conformance testing and options for viewing conformance data. You can perform custom calibrations and manual conformance tests when you install the optional Planar LCD photometer.
- Backlight Saver – Allows you to set periods of inactivity when the system turns off panel backlights; extends the display's clinical life.
- Test Patterns – Provides preset images that show display image quality. Also, using visual and interactive evaluations, allows image quality assessment of displays in various locations and for various shades of gray.
- AAPM TG18 Test – Allows evaluation of grayscale displays using the recommendations of the American Association of Physicists in Medicine, Task Group 18.
- DIN Test – Allows evaluation of grayscale displays for compliance with German standard DIN 6868-57.
- Privilege – Limits the users who can change the operating parameters of the display.
- Reporting – Provides history logs, service information, and records of error conditions.
- Enterprise Management – Allows system administrators to manage remotely any mix of networked Dome CX, Dome EX, Dome QX, and select Planar Desktop displays.

Dome CXtra Services

Refer to *Dome CXtra User's Guide* on the software CD for complete information on the individual services.

Check this table to find out the Dome CXtra services available for your display system.

Service	Dome CX	Dome EX	Dome QX	Planar Desktop [*]
RightLight	✓	✓		
DICal			✓	✓
Backlight Saver	✓	✓	✓	✓
Test Patterns	✓	✓	✓	✓
AAPM TG18 Test	✓	✓	✓	
DIN Test	✓	✓	✓	
Privilege	✓	✓	✓	✓
Reporting	✓	✓	✓	✓
Enterprise Management [†]	✓	✓	✓	✓

* Includes select Planar Desktop models PX191, PX1910M, and PX212M.

† Enterprise Management Service for Dome CXtra is packaged separately.

Installing Dome CXtra

The Dome CXtra software will not install over previous versions. To install this version, first remove any existing version of the software from your computer. See instructions on pages 5 and 6. Refer to *Dome CXtra User's Guide* on the software CD for complete instructions on installing or removing the Dome CXtra software or individual services.

Display system

Make sure that your display is one of the Planar models shown in this table:

Dome CX	Dome EX	Dome QX	Planar Desktop
<ul style="list-style-type: none">• Dome C2• Dome C3• Dome C3i• Dome C5• Dome C5i	<ul style="list-style-type: none">• Dome E2• Dome E2c• Dome E3• Dome E3c• Dome E4c	Dome Q2	<ul style="list-style-type: none">• PX191• PX1910M• PX212M

Operating system

Either Microsoft Windows XP Professional or Windows 2000 Professional.

Display controller and driver

Each display requires installation of its related controller and driver on the computer system. Up to two displays per controller can be installed for Dome CX, Dome EX, and Dome QX display configurations. Installation of the Dome DX or Dome DX2 board requires a PCI slot; AX1 or AX3 board installation requires a PCI Express slot; and EX2 board installation requires an AGP slot.

Display	Display Controller	Display Driver
Dome CX	Dome DX or Dome DX2	Dome DX
Dome EX	AX3 or Dome DX2	AX3 or Dome DX, respectively
Dome QX	AX1 or EX2	AX or EX2, respectively
Planar Desktop	Digital (DVI-D, 24-pin) connection, 1280 x 1024 minimum resolution	Windows 2000 (or later) with support for Windows color gamma correction

Install the Dome CXtra software on local disk drives only. Installation on network drives may cause some components to operate improperly.

To install Dome CXtra

- 1 Turn on your computer and log on with administrator privileges.
- 2 Insert the Dome CXtra installation CD and run setup.exe.
- 3 Follow the instructions on the screen to complete the installation.

NOTE: All Dome CXtra services except the AAPM TG18 and DIN Test services are installed by default. To customize your installation, choose only the services you want by selecting or deselecting them. Installation of the Reporting service is required and is automatic. The application starts upon installation.

To install Enterprise Management Service for Dome CXtra

Follow the instructions for installing an individual service to add the Enterprise Management Service for Dome CXtra. See page 6.

To install the photometer

You can use the optional Planar LCD Photometer to run the RightLight and DiCal custom calibration and conformance test features. Refer to *Dome CXtra User's Guide* on the software CD for installation instructions.

To add or remove individual services

- 1 Turn on your computer and log on with administrator privileges.
- 2 Insert the Dome CXtra installation CD and run setup.exe.
- 3 Follow the wizard instructions to the list of services.
- 4 Select or deselect the services to be added or removed.
- 5 Follow the wizard instruction to complete the installation or removal.

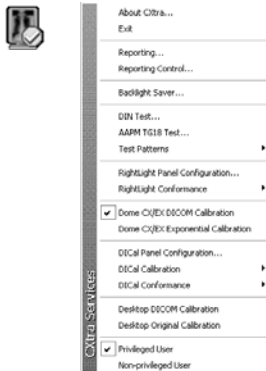
To uninstall the Dome CXtra software

- 1 Turn on your computer and log on with administrator privileges.
- 2 Select Start > Settings > Control Panel > Add/Remove Programs.
- 3 Select CXtra to uninstall the entire application.
- 4 Click Change/Remove to start the uninstall process. Restart the computer.

To use Dome CXtra services

- 1 Click the Dome CXtra icon on the taskbar.
- 2 Select an option from the popup menu.

NOTE: The Dome CXtra software runs automatically when you start your computer. After an application exit or stop, restart the software by selecting Start > Programs > Planar > CXtra.



RightLight Service

The RightLight service provides backlight stabilization, DICOM calibration, and auto and manual conformance testing. This service also reports current white and black levels and allows you to complete these tasks with all Dome CX and Dome EX displays:

- Set a target white level for the displays
 - Equalize the black level across the displays
 - Set a desired response function
 - Specify ambient light in the viewing area
 - Set alerts for auto and manual DICOM conformance and white level tests
 - Perform manual conformance tests using the optional Planar LCD photometer
 - View current conformance status and manual conformance test results
- RightLight automatically calibrates the display at regular intervals. Calibration adjusts the response of the display to conform to the function you specify. There are four calibration response functions, one of which is a correction to the DICOM Grayscale Standard Display Function.

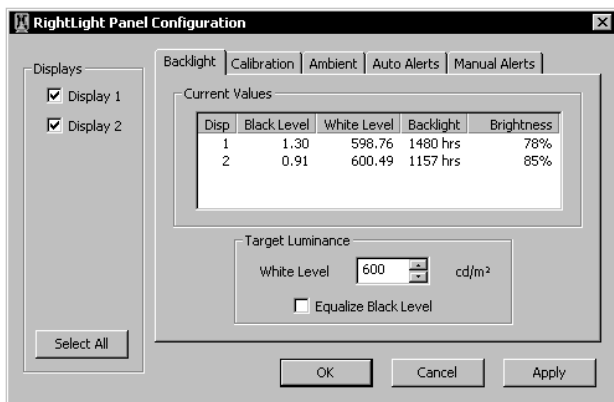
DICOM calibration is based on the display's unique characteristic curve, stored in the unit at the time of manufacture. RightLight routinely checks how well each display conforms to the DICOM standard and calculates a Luminance Uniformity Metric (LUM) value that indicates the degree of conformance.

Configuring the RightLight Service

If you have the Privilege service installed, you must log on as a privileged user to change the RightLight configuration.

On the Dome CXtra services menu, select RightLight Panel Configuration to open the RightLight Panel Configuration dialog. Check the selection box for each display you want to configure, or click Select All. Select the following tabs in the dialog and change the settings as required.

- Backlight
- Calibration
- Ambient
- Auto (Conformance) Alerts
- Manual (Conformance) Alerts



Auto Conformance Testing

Specify the conformance test(s) you want RightLight to run. Every 5 minutes, RightLight automatically performs the tests selected on the Auto Alerts tab.

For each test you select, you can specify a threshold value that defines a test failure. RightLight alerts you of a failure in these three ways: by message, by entries in the History log, and by status change of the Dome CXtra icon in the system tray.

In addition, if the Enterprise Management service is installed, an alert is sent to the Dome Dashboard console or to an SNMP console.

The image shows a screenshot of the 'RightLight Panel Configuration' dialog box, specifically the 'Auto Alerts' tab. The dialog has a title bar with a close button. Below the title bar are five tabs: 'Backlight', 'Calibration', 'Ambient', 'Auto Alerts' (which is selected), and 'Manual Alerts'. On the left side, under the 'Displays' section, there are two checked checkboxes: 'Display 1' and 'Display 2', and a 'Select All' button below them. The main area of the dialog contains three test configurations, each with a checked checkbox and a text box for a threshold value. The first test is 'DICOM LUM Test' with a 'Maximum allowed' value of '1.00'. The second test is 'CX/EX White Level Test' with a 'Tolerance' value of '+/- 10.00 %'. The third section is 'Log Interval', which has a text box 'Every 4.0' followed by 'hours starting at 00:00'. At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Apply'.

RightLight Panel Configuration

Backlight | Calibration | Ambient | **Auto Alerts** | Manual Alerts

Displays

- ☒ Display 1
- ☒ Display 2
- Select All

☒ DICOM LUM Test

Maximum allowed

☒ CX/EX White Level Test

Tolerance +/- %

Log Interval

Every hours starting at

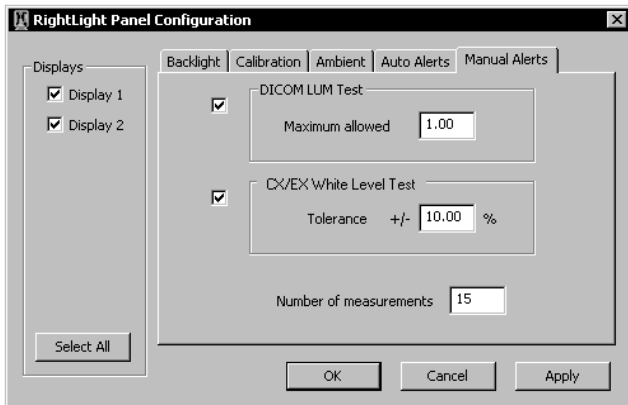
OK Cancel Apply

Manual Conformance Testing

Specify the conformance tests that you want to complete manually. For each manual test that you select, you can specify a threshold value that defines a test failure. Select the number of luminance measurements you want to make during each manual test. The default number of measurements is 15. Selections made on the Manual Alerts tab determine operating parameters for the Conformance Wizard, which directs the manual tests.

When a failure occurs, the Dome CXtra icon is set to a warning state –  .

In addition, if the Enterprise s service is installed, an alert is sent to the Dome Dashboard console or to an SNMP console.



The screenshot shows the 'RightLight Panel Configuration' dialog box with the 'Manual Alerts' tab selected. On the left, under 'Displays', both 'Display 1' and 'Display 2' are checked. A 'Select All' button is at the bottom of this section. The main area contains two test configurations, each with a checked checkbox:

- DICOM LUM Test:** A sub-dialog box containing 'Maximum allowed' with a text input field set to '1.00'.
- CX/EX White Level Test:** A sub-dialog box containing 'Tolerance +/-' with a text input field set to '10.00' followed by a '%' symbol.

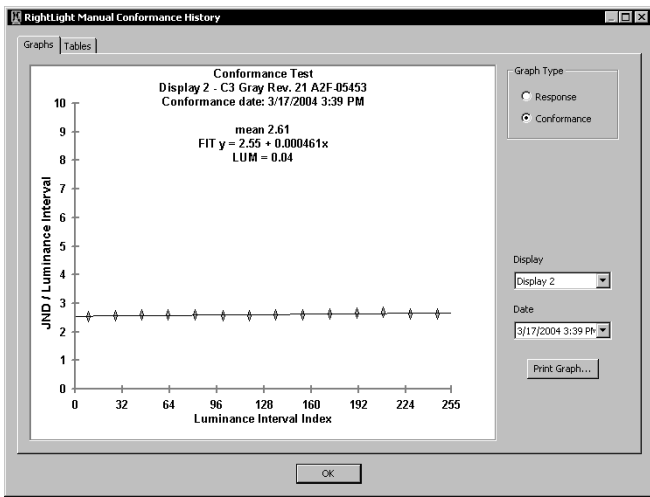
Below these tests, 'Number of measurements' is set to '15' in a text input field. At the bottom of the dialog are 'OK', 'Cancel', and 'Apply' buttons.

Current Conformance Status and Conformance History

Using the Current Conformance Status option, you can view auto conformance results and compare the current status with the last manual conformance results.

You can review summary text reports of auto conformance events and manual conformance events via the Reporting History log.

With the Manual Conformance History option, you can retrieve details of manual conformance events in graphical and tabular formats.



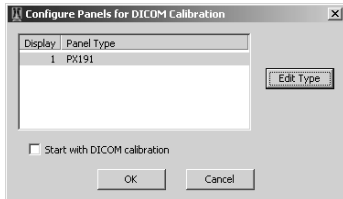
DICal Service

You can calibrate Dome QX and select Planar Desktop displays to conform to the DICOM curve. With the optional Planar LCD photometer, you can also perform custom calibrations and conformance tests.

Configuring the service for display calibration

First, adjust the brightness and contrast of your display. You must use the brightness and contrast settings for your particular display. (Look up the values in the *Dome CXtra User's Guide* and check your display documentation for how to change the settings.) Then, select DICal Panel Configuration on the Dome CXtra services menu. If your panel comes up preselected, then the DICal service is already configured. Otherwise, click Edit Type on the dialog and choose your panel.

Use the Configure Panels dialog to verify the model of your display or to edit the model type.



After configuration, only privileged users can run the Calibration Wizard for custom DICOM calibration. (Default DICOM calibration is active when no custom calibrations are run.) Use the Reporting service to review calibration events. Switch between Original calibration (for running Windows applications) and DICOM calibration (for viewing grayscale images) via the Dome CXtra services menu.

Calibrating the display

The default DICOM calibration is applied to the display whenever you select DICOM Calibration on the Dome CXtra services menu.

You can perform a custom DICOM calibration using the optional Planar LCD photometer. Custom calibration uses the actual luminance values of your display to adjust the response curve. The new values are used in turn to set the default DICOM calibration whenever you select DICOM Calibration on the menu.

NOTE: If you are using a third-party monitor in your display configuration, use the DICal Panel Configuration dialog to characterize the “Unknown” panel. The Desktop DICOM Calibration function is enabled after characterization.

Running conformance test

Only privileged users can run the Conformance Wizard to check display conformance to the DICOM standard. Select the DICOM Calibration option on the Dome CXtra services menu before running a DICal Conformance test.

Reviewing conformance data

Upon completion of the test, you can view or print the conformance test data in graphical or tabular format. To access the data, select DICal Conformance > Conformance History on the Dome CXtra services menu.

Use controls on the Graphs and Tables tabs to select a conformance test and change how the system displays data for the selected test.

Checking calibration and conformance events

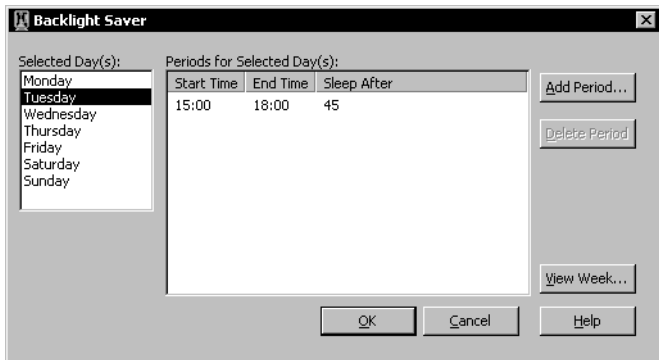
Dome CXtra records an event in the History log of the Reporting service each time you complete a custom calibration or conformance test successfully.

Open the History tab to view the listing of events. Select an event, then click View Detail for summary information.

Backlight Saver Service

Specify when the display system turns off the panel backlights, to extend the display's clinical life. The Backlight Saver service allows you to input a value, in minutes, for the Sleep After parameter. The system turns off the backlight when a period of inactivity exceeds this value.

You can specify different parameter values for each day of the week and various periods during each day.



Test Patterns Service

You can view a variety of test patterns for assessing image quality using the Test Patterns service. Two categories of test patterns are installed with the service.

- AAPM (American Association of Physicists in Medicine) TG18
- Miscellaneous patterns

The following six sets of AAPM TG18 patterns are provided. Most of the patterns are available in a 1024 x 1024 size; some are available in a 2048 x 2048 size. Refer to *Dome CXtra User's Guide* for more information.

- MultiPurpose (1K and 2K)
- Noise (1K only)
- Luminance (1K only)
- Glare (1K only)
- Resolution
- Anatomical

The following miscellaneous test patterns are available.

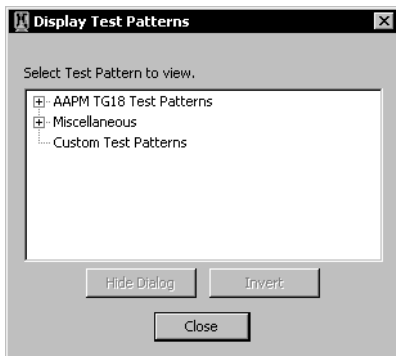
- Bull's-eye
- Horizontal Ramp
- Geometrical Distortions Coarse
- Single pixel
- Geometrical Distortions Fine
- SMPTE
- Geometrical Distortions Hs
- Vertical Ramp

Displaying Test Patterns

NOTE: Some AAPM TG18 patterns have variations such as 10%, 50%, and 80%.

To select and display a test pattern

- 1 Open Dome CXtra services menu > Test Patterns > View Test Patterns.



- 2 On the Display Test Patterns dialog, click the plus (+) sign next to a test pattern set to expand the list and see the variations.
- 3 Click a pattern or variation name to display that pattern. (Click Invert to change black to white and white to black. Not all patterns can be inverted.)
- 4 Click Hide Dialog to provide a clear view of the pattern. (To restore the dialog, press the space bar.)
- 5 Click Close to exit the test pattern and the dialog.

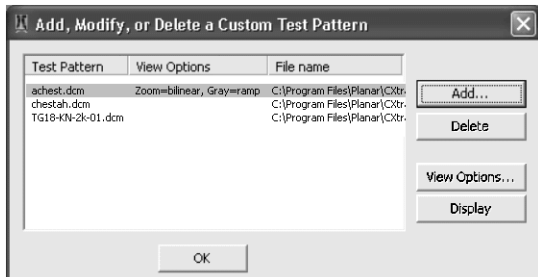
Using Custom Test Patterns

You can add, modify, and delete custom test patterns. To start, open Dome CXtra services menu > Test Patterns > Manage Custom Test Patterns.

On the Add, Modify, or Delete a Custom Test Pattern dialog, you can set viewing parameters for each pattern and add custom test patterns in these formats:

- DCM or DC3 (DICOM)
- JPG
- TIF or TIFF

NOTE: You may need to log on as a privileged user to use custom test patterns.

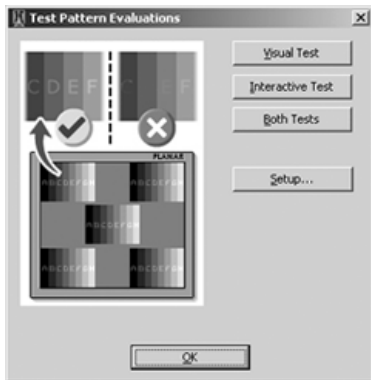


Dome Visual and Interactive Evaluations

You can use the evaluations to assess the image quality of the display panels at various locations and for various shades of gray. These tests can be launched manually or scheduled to run at specific times on local Dome CXtra-enabled workstations. The tests can also be forced from the Dome Dashboard application on a remote workstation.

When launched, the tests run sequentially on all supported displays. Upon completion, test results are logged into Reporting History. If any test fails on any of the displays, it is represented as a warning. The Dome CXtra status icon changes correspondingly.

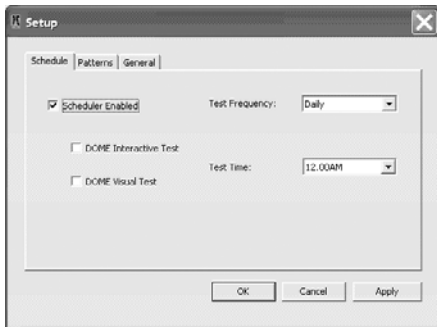
To start, open the Dome CXtra services menu > Test Patterns > Evaluations. Use Setup on the Test Patterns Evaluation dialog to configure test parameters.



Setup

Use the three category tabs on the Setup dialog to configure parameters for scheduling, pattern selection, and user preferences.

- Schedule. Select test time, test frequency, and the test to be scheduled.
- Patterns. Per test, select pattern type or pattern location. Default: Random.
- General. Specify user preferences.



You can run either the Dome Visual Test or the Dome Interactive Test or both. When you run both tests, the Dome Visual Test launches first, followed by the Dome Interactive Test. Refer to *Dome CXtra User's Guide* for test descriptions.

Test modes

- Immediate. Perform tests manually.
- Scheduled. Schedule tests locally on the Dome CXtra-enabled workstation or remotely from the Dome Dashboard console.
- Forced. Force tests from the Dome Dashboard console.

AAPM TG18 Test Service

NOTE: Service available only for Dome CX, Dome EX, and Dome QX displays.

The AAPM TG18 Test service helps you perform various evaluations recommended by the American Association of Physicists in Medicine, Task Group 18. To help you complete a test suite (set of evaluations), the TG18 Test runs a wizard that describes the basic steps you must complete for each evaluation in the test. When an evaluation requires a subjective evaluation of a test pattern, the wizard explains the criteria for satisfactory display performance.

You need a photometer to take luminance measurements on a Dome CX, Dome EX, or Dome QX display. The TG18 Test supports these photometers:

- Wellhofer LXplus
- Minolta LS-100

WARNING: Completion of a TG18 Test frequently requires preparing the display and the environment in accordance with applicable sections of the TG18 document. The wizard used for each evaluation provides only an outline of the basic test steps. It does not describe all prerequisite conditions and information required to perform the evaluation. Refer to the *Dome CXtra User's Guide* for details.

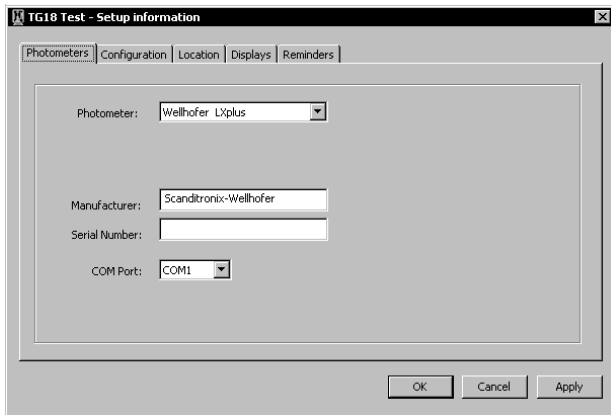
You can change the evaluations included in any test. During setup, identify the photometer to use and define the evaluations you want to complete for the acceptance test, plus the daily, monthly/quarterly, and annual tests. After running the acceptance test, use the other tests to monitor image quality on each display.

Setting Up the TG18 Test

You must complete the setup procedure before you use the TG18 Test to run an evaluation on any display. Select the following tabs in the Setup Information dialog and specify the operating parameters as required.

- Photometers
- Configuration
- Location
- Displays
- Reminders

Before starting, install the photometer that meets the requirements of the evaluations you plan to complete. You need the photometer serial number and the number of the COM port used by the device.



The screenshot shows a Windows-style dialog box titled "TG18 Test - Setup information". It has five tabs: "Photometers", "Configuration", "Location", "Displays", and "Reminders". The "Photometers" tab is selected. Inside the dialog, there are four fields: "Photometer:" with a dropdown menu showing "Wellhofer LXplus"; "Manufacturer:" with a text box containing "Scanditronix-Wellhofer"; "Serial Number:" with an empty text box; and "COM Port:" with a dropdown menu showing "COM1". At the bottom right, there are three buttons: "OK", "Cancel", and "Apply".

Running TG18 Tests and Viewing Results

To run a test, select AAPM TG18 Test on the Dome CXtra services menu. Next, on the TG18 Test dialog, select the display you want to test from the Display list box. Then, choose the test and click Run Test. Use the photometer you specified during the setup process and follow the wizard instructions.

NOTE: Some evaluations require multiple wizard dialogs to complete. Clicking Skip moves to the next evaluation, not to the next dialog in the current evaluation.

After you complete all evaluations in the test successfully, you have options for viewing and saving the report. Click Save As to store the report as an .RTF file.

TG18 Test Finished (73 / 73)

All the evaluations for this test have been completed.

Please provide some information on the person who ran the test.

Tester's Name:

Tester's Company:

Display:

Serial Number:

Test Plan:

Test Date:

< Back Save As Save Report View Report Finish

DIN Test Service

NOTE: Service available only for Dome CX, Dome EX, and Dome QX displays.

The DIN Test service offers both the DIN Acceptance Test and the DIN Constancy Test. Run the acceptance test first, then run the constancy test periodically (as required) to validate the display based on the acceptance test results.

Complete this German standard (DIN 6868-57) test for measuring the performance of medical imaging devices. Any Dome CX, Dome EX, or Dome QX display must meet the criteria for satisfactory operation before the device can be used in a healthcare environment.

During setup, identify the photometer to use with this service and the medical image to use in the acceptance test. Run the DIN Acceptance Test as required to satisfy local testing standards. Run the DIN Constancy Test for display validation. Both tests are executed via wizards.

You need a photometer to take luminance measurements on a Dome CX, Dome EX, or Dome QX display. The acceptance test supports these photometers:

- Wellhofer LXplus
- Minolta LS-100

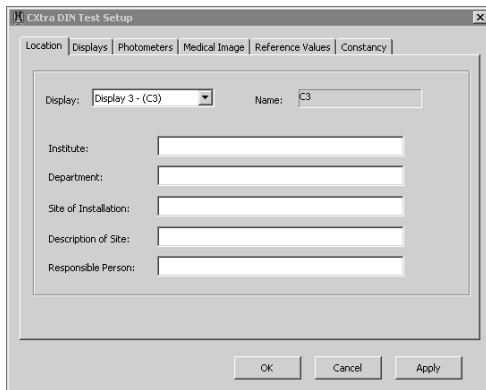
A supported photometer is able to automatically transfer measurements to the DIN Acceptance Test software. You can use other photometers that meet the requirements of a DIN evaluation, but you must manually enter measurement values as part of each procedure requiring a photometer.

Setting Up and Running the DIN Acceptance/Constancy Test

Select the following tabs in the Setup dialog to specify operating parameters.

- Location
- Displays
- Photometers
- Medical Image
- Reference Values
- Constancy (default settings recommended)

To run a test, select DIN Test on the Dome CXtra services menu. Next, on the DIN Test dialog, select the display you want to test from the Display list box. Then, click Run Acceptance Test or Run Constancy Test. Use the photometer you specified during the setup process and follow the wizard instructions. The results of a successful test appear on the Reference Values tab. The test event is recorded in the Reporting History log.



The screenshot shows the 'CXtra DIN Test Setup' dialog box. It has a tabbed interface with the following tabs: Location, Displays, Photometers, Medical Image, Reference Values, and Constancy. The 'Displays' tab is currently selected. Inside this tab, there is a 'Display:' dropdown menu showing 'Display 3 - (C3)' and a 'Name:' text box containing 'C3'. Below these, there are five text input fields labeled: 'Institute:', 'Department:', 'Site of Installation:', 'Description of Site:', and 'Responsible Person:'. At the bottom of the dialog, there are three buttons: 'OK', 'Cancel', and 'Apply'.

Privilege Service

You get two modes of system operation with the Privilege service: the privileged mode and the non-privileged mode.

You can access the privileged mode by entering an assigned password. The default password is `cXtra`.

Privileged users have complete access to change Dome CXtra operating parameters. Non-privileged users are unable to change critical Dome CXtra parameters, such as those affecting calibration.

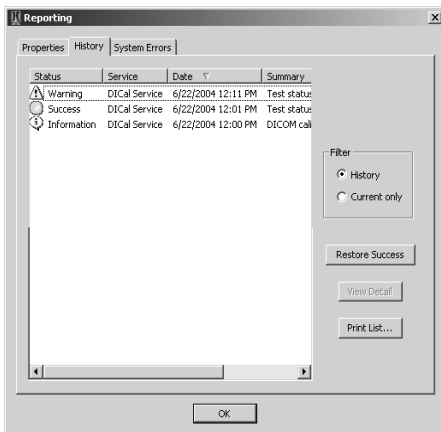


Reporting Service

Use the Reporting service to retrieve information on Dome CXtra properties, view Dome CXtra history, and display system errors.

The Reporting option organizes information on three tabs: Properties, History, and System Errors. Use the Properties tab to access service information, the History tab to view summary and detailed information on Dome CXtra events, and the System Errors tab to view the events related to error conditions.

With the History tab (shown here), you can view complete history, use the filter to view only current events, and restore the success Dome CXtra icon on the taskbar. The summary and detailed reports provide the results of conformance tests.



Enterprise Management Service

Manage multiple display models—Dome CX, Dome EX, Dome QX, and select Planar Desktop displays—from a central location using the Dome Dashboard software or any SNMP console application. You must install the Enterprise Management Service on each computer supporting the displays you want to monitor remotely. Have a system administrator decide on all settings to ensure that this service operates in accordance with local network policies.

To install the Enterprise Management service

- 1 Refer to the documentation for your console application. For the Dome CXtra software to work with your specific SNMP console application, the Planar Management Information Base (MIB) must be integrated into the console application.
- 2 Install the Enterprise Management service on the computer associated with each display you need to manage. Installing the service allows you to read panel data from the Dome Dashboard console or an SNMP console.
- 3 After installing the Enterprise Management service, you must configure the Windows SNMP service on the computer. First, be sure the SNMP service is installed and running. Next, with the service running, open the SNMP Service Properties dialog. Then, modify the fields on the Traps and Security tabs.

Refer to “Enterprise Management Service” in the *Dome CXtra User’s Guide* for more information.



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