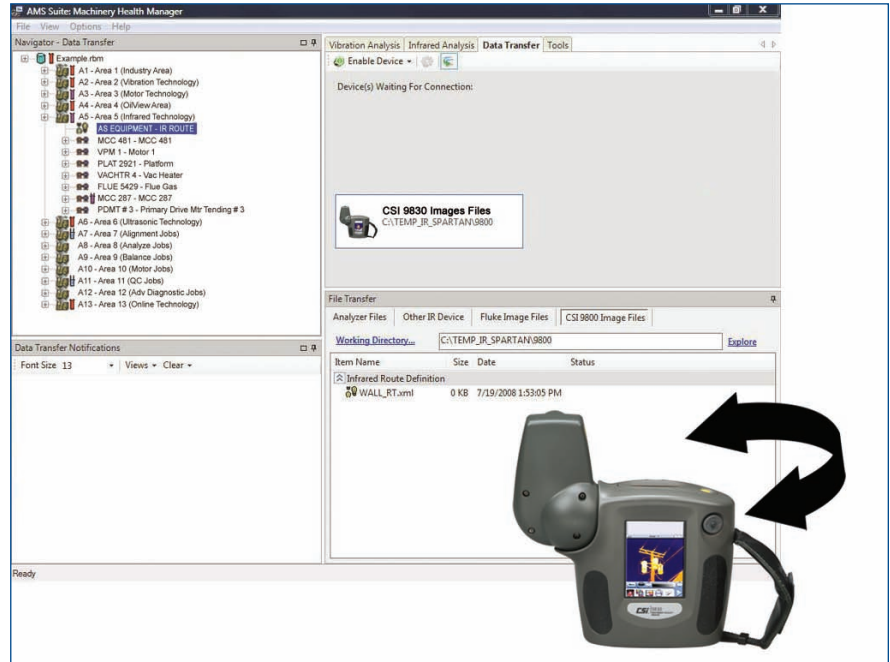


Infrared Analysis Software and CSI 9830 Machinery Health[®] Imager

- *Route-based thermal imaging linked to a vibration analysis program provides a more accurate picture of machinery health*
- *Diagnostic Fault Tree in AMS[™] Suite: Machinery Health Manager simplifies diagnostics and documentation of thermal scans*
- *CSI 9830 Machinery Health Imager integrates state-of-the-art infrared imaging technology in a 640x480 resolution camera*

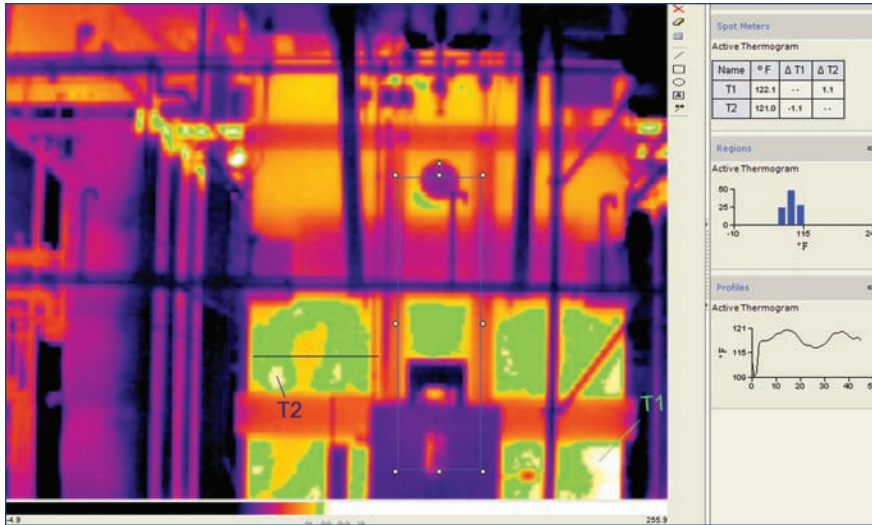


Effectively manage your thermal imaging program with AMS Machinery Manager and the route-on-board capability of the CSI 9830.

Introduction

For many years, maintenance departments across industries have used thermal imaging to acquire valuable information on mechanical assets and electrical systems in the plant; yet thermal image analysis is often at odds with the rest of the maintenance program. Thermal imaging programs have operated mostly outside of the route-based vibration programs and machinery health database, particularly if collected by an

outside service. Even if the data had been uploaded to the database and tied to the appropriate assets, the ability to use that data was extremely limited. The ability to manage and analyze thermal image data in the same database with - vibration and oil analysis data simply was not available... until now.



AMS Machinery Manager offers a full selection of thermal imaging analysis and annotation tools such as labeling, thermal profiling, histograms, isotherms, and spot temperature meters to diagnose and report on the machinery health.

Emerson offers a complete solution with the features your maintenance program needs to manage a thermal imaging program alongside your vibration and oil analysis programs. The integrated Infrared Analysis module in AMS Machinery Manager establishes a solid foundation for your thermal imaging program.

The Infrared Analysis module allows you to execute the program setup, plan equipment routes, perform accurate analysis of the data, organize information, and report on inspection findings.

You can also download routes to and upload data from the CSI 9830 Machinery Health Imager. Now you can run your thermal imaging program with the same efficiencies and flexibility as your vibration and oil analysis program.

Infrared Analysis in AMS Machinery Manager

A successful and efficient thermal imaging program uses more than just an infrared camera. With AMS Machinery Manager you can set-up and execute a well-planned thermal imaging program that mirrors the structure of your vibration analysis program, from set-up to route-based collection and reporting.

The route mode automatically manages the images after they are assigned to measurement points on the route. Upload a route back to AMS Machinery

Manager and it automatically assigns the images and field annotations to the correct measurement locations in the database. The route list also ensures accurate documentation for all scanned equipment. For off-route images, simply drag-and-drop image files onto the desired measurement points in the database tree.

The Infrared Analysis module features a Diagnostic Fault Tree that contains a log of equipment types, fault types, and recommended actions for those faults. Rather than simply annotating thermal images, you can create a detailed fault analysis of the image. The Fault Diagnostic Tree reduces the time needed to analyze and report on images and provides standard, consistent analysis of anomalies, even between different thermographers.



Even novice thermographers will find the CSI 9830 intuitive and easy-to-use.

Once images are downloaded to the AMS Machinery Manager database, the Infrared Analysis module provides a complete set of post-scan analysis tools, such as:

- Spot meter placement to indicate specific location temperatures
- Temperature profile plot that indicates temperature change along a line
- Temperature histogram plot shows the distribution of temperature ranges within a designated area
- A full array of color palettes
- Isotherm function to identify points of an indicated temperature on an image
- Custom reports using any combination of analysis tools, in-field notes, annotations and fault analysis indication of the machine health

Because the database seamlessly integrates thermal analysis with other machinery health technologies, reports generated from AMS Machinery Manager are powerful cross-technology tools for verifying the fault and severity of machinery problems. When that data is shared across plant networks, information is available for quick decision-making.

CSI 9830 Machinery Health Imager

The CSI 9830 offers advanced technology and the highest-available image resolution. The combination of simplified image interpretation and high quality reports make it ideal for Machinery Health Management programs. Industry-leading thermal sensitivity allows for earlier problem detection. The accuracy of a 500:1 spot size results in an increased range on all inspections.

The touch-sensitive LCD screen displays the image, temperature analysis, camera settings and status indicators. The icon-based menu displays all key controls simultaneously to eliminate complex pull-down menus. The intuitive interface will have you using the camera in minutes.

When combined with AMS Machinery Manager, the CSI 9830 features on-board route capability for highly-organized repeatable scans, reporting, and analysis. Drag-and-drop individual images or entire routes of images to AMS Machinery Manager through the USB cable or memory card reader.

Comprehensive Measurement Tools

A comprehensive set of measurement tools enhance the CSI 9830's fully radiometric images. Five spot meters, an area box, and a thermal line profile provide additional image data. An accuracy of $\pm 2\%$ allows for precise readings even at significant distances for increased safety and flexibility when scanning electrical or power transmission assets. The CSI 9830 also features an integrated 1.3 megapixel flash/torch lighted camera.



The CSI 9830 Fusion Mode reveals the infrared data over the visible image only in areas where temperatures fall within a customizable range.

Picture-In-Picture and Fusion

The CSI 9830 built-in visual camera works together with the infrared camera to speed component identification and improve accuracy. Touch the on-screen icon to switch from a visual image to an infrared image. Then view a live visual image within the live infrared image - or vice versa. Fusion mode superimposes a thermal image over the visible image in areas that meet a user-defined temperature. This advanced image technology helps you to quickly locate objects during a scan.

Laser Target Highlighter

A patent-pending system for pinpointing objects makes the laser highlighter a standout feature of the CSI 9830. A pair of red visible light lasers are integrated on either side of the camera and set at an angle so

that they always intersect at the proper point. A tap on the main screen laser icon projects an X on the object to be scanned - always at the location of the CSI 9830 center spot meter. This new method of targeting accurately simplifies proper targeting and identification regardless of distance.

Ergonomic Design for Viewing Objects at Different Levels

Floor Level¹ Viewing

The unique rotating eyeball of the CSI 9830 allows you the flexibility to crouch, to maintain a perpendicular view, or stand upright. Just rotate the eyeball where you need it - down to view objects at floor level or up for an overhead view.

Strike Zone¹ (belt level) Viewing

Every individual's comfortable stance for using scanning instruments is slightly different.

The CSI 9830 eyeball enables you to hold the camera in the most natural position for you and rotate the eyeball to view the object.

Overhead¹ Viewing

When viewing overhead objects, CSI 9830's articulating eyeball ensures that you maintain line of sight and optimal viewing angle and wrist position.

Viewing Angle²

All LCD-type displays are best viewed at a perpendicular angle. The CSI 9830 LCD incorporates enhancements for a wider range of viewing angles.

¹ Viewing angle and grip angle remain constant for all viewing levels.

² Human Factors Specification Mil-Std 1472f



Standard Configuration

- Emerson A9830
- Lithium-Ion Batteries (2)
- Universal AC Power Supply
- USB Cable - Mini B Jack
- 512 MB CF Memory Card
- Hardside Carrying Case
- Battery Charger
- Operator Manual

Ordering Information

A9830

- CSI 9830 Machinery Health Imager

A9830E

- CSI 9830E Machinery Health Imager. Same specifications as a CSI 9830 minus live VGA video output.

A9830E9

- CSI 9830 Machinery Health Imager. Same specifications as a CSI 9830 minus live VGA video output. Frame rate is 9Hz versus 30Hz.

A479400

- Infrared Analysis Silver Software

A479500

- Infrared Analysis Gold Software

A98830-S

- CSI 9830 Machinery Health Imager + Infrared Analysis Silver Software

A9830-G

- CSI 9830 Machinery Health Imager + Route Based Infrared Analysis Gold Software

A9830E9-G-IN

- CSI 9830E9 Machinery Health Imager + Infrared Analysis Gold Software

A9830E9-S-IN

- CSI 9830E9 Machinery Health Imager + Infrared Analysis Silver Software

914636

- Rechargeable Batteries

CSI 9830 Technical Specifications

Resolution

- 640x480 pixels

Detector Type

- VOx Microbolometer

Sensitivity

- 50mK (0.05°C)

Field of View / Min. Focus

- 25°x18° / 0.4m

Spatial Resolution

- 0.71 mrad

Frame Rate

- 30Hz

Focus

- Manual

Electronic Zoom

- 4X

Visible Camera

- 1280x1024 pixels, flash, torch

Image Presentation

Image Modes

- IR/PIP/Fusion

Display

- 3.5" 640x480 LCD touchscreen

Color Palettes

- 7 (4 color, 3 grey)

Measurement

Temperature Range

- -20°C to 500°C (-4°F to 932°F)

Accuracy

- $\pm 2^{\circ}\text{C}$ ($\pm 3.6^{\circ}\text{F}$) or $\pm 2\%$ — whichever is greater

Spot Size Ratio

- 500:1 (standard lens)

Measurement Modes

- Point (5) Line, Area (user defined)

Measurement Correction

- emissivity, background / transmission / ambient

Image Storage and Camera Functionality

Digital Media

- 512MB CF card (~600 hi-res images)

Internal Image Capacity

- 512MB (~600 hi-res images)

Recording Modes

- Snapshot/sequence (optional)

Image Annotation

- Touchscreen data logger GUI

In-Camera Routing

- Included, may require applicable software

Target Marker

- Dual laser line target identifier

Classification

- Class 2

Menu Controls

- Visible Light Camera, Laser Target Locator, Palette, Automatic Gain Control (AGC), Touchup (NUC), Image Export, Image Recall, Object Parameters, Line Profile, Area Tool, Spot Meter, Temperature Range, Measurement Units, Touch Calibrate, Date and Time, LCD Brightness, File Explore, User Configuration Settings, Information, Help

Power

Battery Type

- Rechargeable Lithium-Ion

Battery Run Time

- 2.5 hours

Battery Charging

- 10-16VDC input. Charging status LED

AC Power Supply

- 100-270 VAC, 50/60 Hz

Environmental

Operating Temp. Range

- -5°C to 50°C (23°F to 122°F)

Storage Temp. Range

- -30°C to 70°C (-22°F to 158°F)

Humidity

- 10% to 95% IEC 360

Water and Dust

- IP-54

Shock / Vibration

- 25G, IEC 68-2-29 / IEC 68-2-6

Physical

Weight

- 2.7 lbs.

Dimensions (WxHxD)

- 7.5" x 7.5" x 3"

Interfaces

Real-Time Digital Output

- USB 2.0

Image Transfer

- USB 2.0, CF card

Video

- NTSC

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AMS Suite: Machinery Health Manager powers PlantWeb with predictive and proactive maintenance through condition monitoring of mechanical equipment to improve availability and performance.