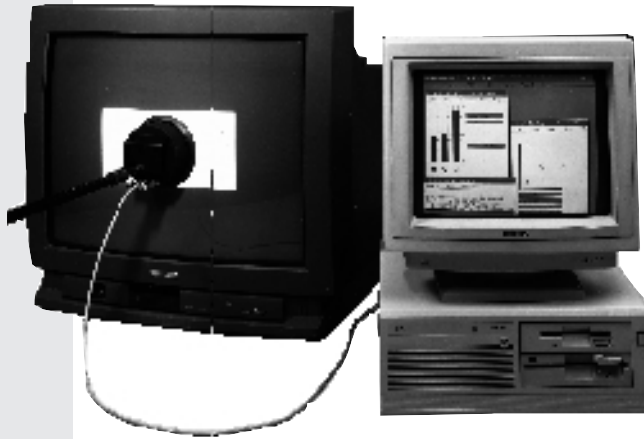# Industrial CRT Color Analyzer, PM 5639/20 & PM 5639/21

- **Displays any CIE system: xy - uv - u'v' - X,Y,Z, color difference and correlated color temperature**
- **Color sensor operates directly with standard RS-232 C serial port**
- **Extremely stable color sensor with new dichroic filters**
- **Measurement independent of phosphors**
- **Unique, easy-to-use graphical display of color coordinates**
- **Relative RGB bars of any phosphor type to any white reference**
- **Accepts any field rate - including data monitors and HDTV**
- **Interfaces to software (Basic, C and Pascal) for automatic adjustment**

Application

The PM 5639/20 industrial CRT Color Analyzer is used as an adjustment tool for CRT- based color TV sets in manual, automatic, or semi-automatic production lines. The adjustment may include black level, the "color of black", contrast level, the "color of white", and the color balance and luminance level at any point in between.

The software program included in the PM 5639/20 package makes it possible to use the measuring results in a wide range of different ways. The software can show the measured results directly as CIE values or as differences between the pre-programmed white reference and the actual color. The results may also be shown as relative RGB values. The software makes it possible for the user to program his/her own automatic adjustment routines for controlling mechanical screwdrivers, RC5 or I2C interfaces to the set under test, and mechanical elements which transport the set being tested and move the color

sensor. This programming can be done in Basic, C, or Pascal.

The software allows storage of the measurements for later examination in order to facilitate statistics and quality control.

The Industrial CRT color sensor is a rugged and very fast color sensor optimized for use in industrial environments. The color sensor communicates with the controlling PC by means of a standard RS-232 C interface. The filters used in the color sensor to simulate the CIE Standard Observer response are very high-grade dichroic filters. This assures a stability and accuracy which is very hard to obtain with conventional filter designs.

PM 5639/21 Industrial CRT, Color Analyzer, Double Sensor Version

For users who wish to use double sensor setups, the software may operate two measuring heads at the same time and present simultaneous displays on the PC.

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Modes of Display

The color sensor operates with CIE 1931 Standard Observer response filters, thus making it possible to display absolute color coordinates.

- xyY mode:
  x and y coordinates are plotted in the central portion of the CIE 1931 diagram, and the x, y, Y (luminance value) and the color error (CIELUV) are displayed in numerical form together with the correlated color temperature. The reference point is shown as a box and the actual color is shown as a cross.
  The color error is calculated as the difference between the selected color reference and the actual color according to the CIE 1976 L*u*v* (CIELUV) color space definition.

- $\partial x \partial y Y$ mode:
  The ∂x and ∂y differences are plotted in a co-ordinate system with origin at the white reference point. The white reference, the x and y values, and the luminance value Y are shown in numerical form. The error is shown as a vector ($\partial x, \partial y$).

- u'v'Y mode:
  The u' and v' (also called u* and v*) coordinates are plotted in the central portion of the CIE 1976 diagram. The u', v', Y (luminance value), and the color error (CIELUV) are shown in numerical form. The

reference point is shown as a box and the actual color is shown as a cross.

- $\partial u' \partial v' Y$ mode:
  The $\partial u'$ and ∂v differences' are plotted in a co-ordinate system with origin at the white reference point. The white reference, the $\partial u'$ and the $\partial v'$ values and the luminance value Y are shown in numerical form. The error is shown as a vector ($\partial u', \partial v'$).

- uvY mode:
  u and v coordinates are plotted in the central portion of the CIE 1960 diagram. The u, v, Y (luminance value) and the color error (CIELUV or JND) are shown numerically. The reference point is shown as a box and the actual color is shown as a cross.

- $\partial u \partial v Y$ mode:
  The ∂u and ∂v differences are plotted in a co-ordinate system with origin at the white reference point. The white reference, the ∂u and the ∂v values, and the luminance value Y are shown in numerical form. The error is shown as a vector ($\partial u, \partial v$).

- XYZ mode:
  The CIE 1931 XYZ values are shown as bar graphs. The values are the direct output from the CIE standard observer response filters normalized to the selected white reference.

The display is the same as an RGB display without phosphor compensation.

- XYZ abs. mode:
  The CIE 1931 XYZ values are shown as bar graphs. This display is the same as the XYZ mode except that the values are normalized to a preselected absolute luminance value. The display is the same as an RGB fixed level display without phosphor compensation.

- RGB mode:
  Red, green, and blue values are shown as colored bar graphs. The color balance is relative to a selected white reference and phosphor. The display reference may be either one of the red, green, or blue inputs, or the luminance or a previous measurement. The phosphor compensation removes the "crosstalk" (specified by the CIE standard observer response curves) between the red gun and the blue and green bars (and the same for the other possibilities).

- RGB fixed level mode:
  This display is the same as the RGB display except that, in addition to the normalization to a white reference and phosphor, the display is also normalized to a preselected fixed luminance value.

Product Data

Measurement Range
- Luminance 0.1 to 1000 cd/m^2 (0,03 ftL)
- x and y values: 0.000 to 0.800
- Correlated Color Temperature: 1.900 K CCT to 12.000 K CCT

Accuracy
- The following specifications apply to a measurement with an illuminant D6500 standard monitor[1] at a luminance level of 80 cd/m^2 (23,3 ftL) and at an ambient temperature between +15°C (+59°F) and +30°C (+86°F)

- xy coordinates: Better than ± 0.002
  - Repeatability: Better than ± 0.002
  - Luminance (Y): Better than ± 2% ± 1 digit
  - Repeatability: Better than ± .0,3%, ± 1 digit
- XYZ/RGB bars: Better than ± 1%
  - Repeatability: Better than ± 1%
  - Luminance (Y): Better than ± 2%, ± 1 digit
- Measuring rate:
  3 to 10 measurements/ second
- Settling time:
  Within 1% after 1 second
- Correlated color temperature:
  ± 50 K CCT

[1]: *Calibration of the standard monitor is traceable to international light standards*

Memory
- References: The white references are stored in the controlling computer. The number of white references are limited only by the computer.
  Legal values for x and y are between 0.200 and 0.600

PM 5639/20 & PM 5639/21 - Data Sheet

- CRT/Phosphors: 30 different phosphors may be stored in the color sensor, Additional phosphors may be stored in the PC. Phosphors may be stored via the "Learn phosphor" function (only applicable when using the RGB bar display).
- Set-ups: An unlimited number of measuring setups may be stored in the PC. A measuring setup includes the display mode, CRT/phosphor, white reference, and measuring units
- Measurements: An unlimited number of measurements may be stored and recalled for later investigation and statistical analysis. Stored measurements may also be used as white references.

Factory Programming
- White ref.:
  - D6500 (x = 0.313, y = 0.329)
  - 3200 K (x = 0.423, y = 0.399)
  - 9300 K (x = 0.285, y = 0.293)
- Other white references may be stored using the "Learn white reference" function, as measurements or put directly in the file containing the white reference.

General Specifications

Power Supply
The color sensor is powered from a power supply box inserted between the PC and the color sensor
- Mains consumption: 85-250 VAC 15 VA. 48 to 65 Hz

Mechanical Data
- Color Sensor:
  Diameter of house: 108 mm (4.25")
  Diameter of rubber shadow pad: 120 mm (4.75")
  Height: 70 mm (2.75")
  Weight: 250 g (0.55 lbs)

- Power supply box:
  Size: 185 x 95 x 65 mm (7.3" x 3.8" x 2.6")

Environmental Conditions
- Operational temperatures: 10°C to +40°C (+50°F to +104°F) (non condensing)
- Storage temperatures: - 10°C to +70°C (- 14°F to 158°F)
- Vibration: IEC 68-2-6 F; 5-50-200 Hz 0.7 mm_{PP} 50 m/s^2; 1 oct/min; 3 x 30 min

- Bump: IEC 68-2-29 part 2; 350 m/s^2 1000 bumps in 3 directions
- Repetitive bump: 120 m/s^2

Safety
- In accordance with IEC 348 class 1

Hardware Requirements

- IBM PC AT/386/486/Pentium, PS/2 or compatible
- 512 Kbytes RAM
- One floppy disk drive (5$1/4$" or 3$1/2$")

- MS-DOS, PC-DOS or DR-DOS (version 3.3 or higher)
- For full use of the display facilities a 100% compatible IBM EGA/VGA graphic adapter is recommended

- The software can be run from a floppy disk but a harddisk is recommended

Accessories

The PM 5639/20 Industrial CRT Color Analyzer package includes:
- Industrial CRT Color Sensor
- Software display package
- Software package PASCAL
- Software package C
- Software package BASIC

- Power supply box for the color sensor
- Interface cable for use between PC and power supply (sub-D connectors)
- Interface cable for use between power supply and color sensor (Sub-D connectors)

- Sub-D 9 to 25-pin adaptor
- Mains cable
- Operating manual

Industrial CRT Color Analyzer, double sensor version, PM 5639/21

The PM 5639/21 Industrial CRT Color Analyzer, double sensor version includes:

- Two Industrial CRT Color Sensors
- Industrial CRT Color Sensor
- Software display package
- Software package PASCAL
- Software package C
- Software package BASIC
- Power supply box for the Color Sensor
- Interface cable for use between PC and power supply (sub-D connectors)
- Interface cable for use between power supply and color sensor (Sub-D connectors)
- Sub-D 9 to 25-pin adaptor
- Mains cable
- Operating manual

Ordering Information

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PM 5639/20	Industrial CRT Color Analyzer	9449 056 39201
PM 5639/21	Industrial CRT Color Analyzer, double sensor version	9449 056 39211

PM 5639 Family

PM 5639/00	CRT Color Analyzer with handheld display unit	9449 056 39001
PM 5639/01	CRT Color Analyzer with PC software	9449 056 39011
PM 5639/02	Auto Color Alignment System for Barco® Monitors	9449 056 39021
PM 5639/03	Auto Color Alignment System for Sony® Monitors	9449 056 39031
PM 5639/10	Projector Color Balance meter	9449 056 39101
PM 5639/20	Industrial CRT Color Analyzer, single sensor version	9449 056 39201
PM 5639/21	Industrial CRT Color Analyzer, double sensor version	9449 056 39211
PM 5639/25	Miniature CRT Color Analyzer	9449 056 39251
PM 5639G/82	Color Alignment Generator, component 625 lines	9449 056 39823
PM 5639M/82	Color Alignment Generator, component 525 lines	9449 056 39828
PM 5639G/83	Color Alignment Generator, composite 625 lines, PAL	9449 056 39833
PM 5639M/83	Color Alignment Generator, composite 525 lines, NTSC	9449 056 39838

Options

PM 5639/61	Extension kit - to upgrade PM 5639/20 to PM 5639/21	9449 056 39611
PM 5639/62	Extension kit - to upgrade PM 5639/00 to PM 5639/01	9449 056 39621
PM 5639/63	Auto Color Alignment Option for Barco® Monitors	9449 056 39631
PM 5639/64	Auto Color Alignment Option for Sony® Monitors	9449 056 39641
PM 5639/80	Display Unit	9449 056 39801
PM 5639/90	CRT Color Sensor	9449 056 39901

FOR FURTHER INFORMATION

Contact the PTV sales office in your area, or contact us directly:

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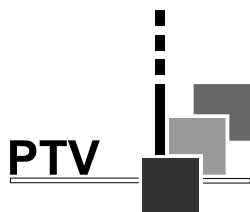
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