CRT/LCD Colour Analyser

PRODUCT CODE: PM5639 KIT CRT/LCD

DK - Technologies

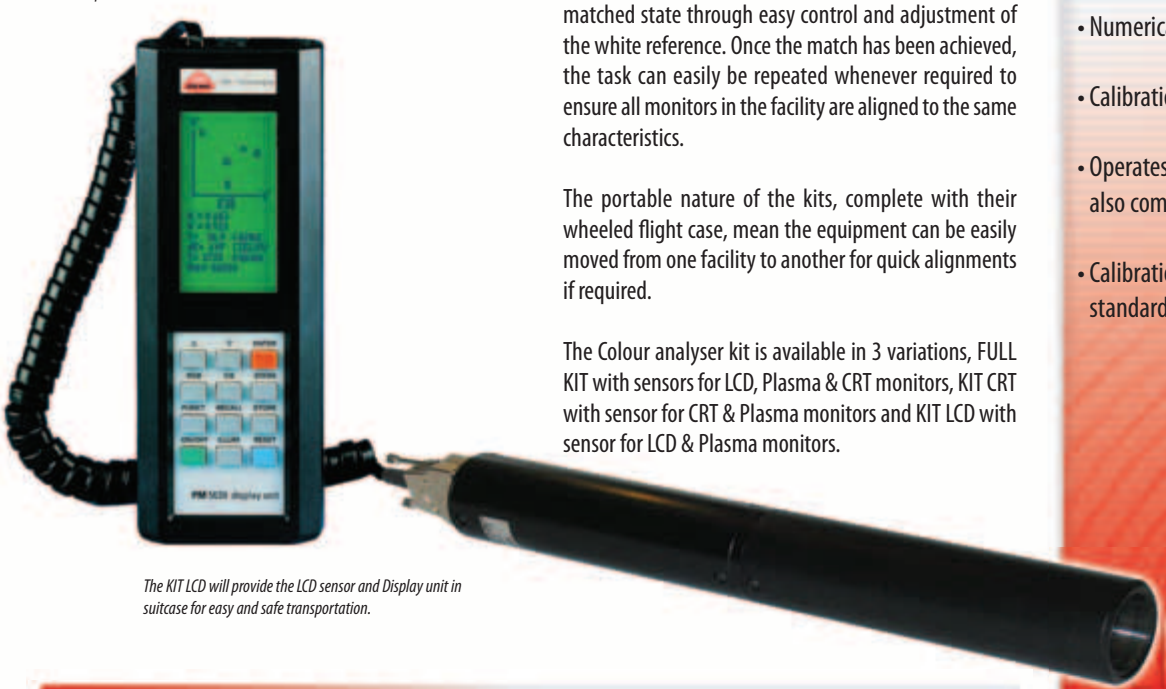
The KIT CRT will provide the CRT sensor and Display unit in suitcase for easy and safe transportation.

With the increasing interchange of program material from different sources such as TV studios and production houses and the ever greater number of viewing monitors available to programme makers and broadcasters, uniformity between monitors has become a critical issue. It is becoming more difficult to achieve colour, contrast and light level consistency between monitors, even from the same manufacturer.

DK-Technologies' Colour Analysers allow the user to check and align LCD, Plasma and CRT monitors to a constant matched state through easy control and adjustment of the white reference. Once the match has been achieved, the task can easily be repeated whenever required to ensure all monitors in the facility are aligned to the same characteristics.

The portable nature of the kits, complete with their wheeled flight case, mean the equipment can be easily moved from one facility to another for quick alignments if required.

The Colour analyser kit is available in 3 variations, FULL KIT with sensors for LCD, Plasma & CRT monitors, KIT CRT with sensor for CRT & Plasma monitors and KIT LCD with sensor for LCD & Plasma monitors.



The KIT LCD will provide the LCD sensor and Display unit in suitcase for easy and safe transportation.

Features...

- Colour balance alignment of LCD, Plasma and CRT monitors
- Handheld battery operated display unit
- User-friendly RGB bargraph display for easy adjustment of the monitor
- Optical system for spot measurements (LCD only)
- High speed operation for automatic manufacturing systems
- Communicates with standard RS-232 interface
- True CIE Standard Observer characteristics
- Reproducible and accurate alignment of any monitor
- Numerical outputs of CIE XYZ values
- Calibration to any white reference
- Operates independent of field rate, also computer graphics and HDTV
- Calibration traceable to international standards

The Next Generation

CRT/LCD Colour Analyser

DK - Technologies

THE ABSOLUTE MEASURING MODES

Two absolute measuring modes both defined by CIE, the International Commission on Illumination, are realised in the PM5639.

xyY & u'v'Y

The xy system is the original CIE 1931 colour measuring system. The u'v' CIE 1976 is later made as a change to the original xy system.

The latter system is more colour uniform than the original, meaning that the system is a better description of the human colour perception, related to the perception of colour differences. It is possible by numeric calculation to convert from one system to the other.

The colour coordinates are shown in either an xy or an u'v' diagram, and at the same time the numerical chromaticity values are shown together with the luminance value (Y) and the correlated colour temperature.

In the RGB bargraph display the difference between the reference values and the measured values are displayed.

In all modes the colour error dE CIELUV is calculated as the difference between the reference and the actual colour according to the CIE 1976 L*u*v* (CIELUV) colour space definition. 1 CIELUV is very close to the smallest colour difference, detectable by the human eye.

The display on the Display Unit, will show the measurement graphically in a coordinate system, where the pre-programmed colour reference is shown as a small box and the measured colour as a dot. The monitor is adjusted correctly when the dot falls within the box. Using the zoom function, this adjustment can be done very accurately. The luminance Y is shown in the units selected by the user i.e. candela/m^2, NIT or foot-Lambert.

These absolute measurements are made possible by using the concept, which relies on optical interference (dichroic) filters. With interference filters it is possible to match closely the colour response of the Standard Observer as defined by CIE. This together with a traceable calibration assures a close alignment of the white reference on any monitor independent of the monitor brand.

RGB MEASURING MODE

In the RGB measuring mode the red, green and blue values are shown as three analogue bars. These bars are displayed relative to the white reference. There are four possibilities:

- **Two of the primary colours are related to the third**
- **All three primary colours are related to a pre-programmed white reference**
- **All three primary colours are related to one of the measurements stored in the memory of the colour analyser**
- **All three primary colours are related to an absolute reference level selected by the user**

In all cases the absolute luminance value will be displayed in Candela/m^2, NIT or footLambert as selected by the user. In the RGB display mode, the adjustment is carried out by bringing the amplitude of the three bars into the centre of the display. It is also possible to use a zoom function to increase the resolution and make a more accurate adjustment.

For the RGB mode to work correctly, the instrument has to know the actual phosphors. This is accomplished in a couple of minutes by use of the monitor controls and the Colour Analyser "learn" mode.

The "learn" mode procedure removes the interaction (crosstalk) between phosphors when viewed by the tri-receptors. The phosphors can be stored and named in the colour analyser for later use.

The following parameters have been factory programmed. The user can program more himself: Two different standard phosphors have been pre-programmed: EBU and SMPTE "C".

- A maximum of 28 different phosphors can be stored with the "learn" facility.
- The three most used references: D6500, 3200 K and 9300 K are preset from the factory.
- Different white references can be programmed into Display unit or PC either as a measurement of the CRT, or the reference can be entered directly as x and y values.
- Three different measuring units. The user can select between Candela/m^2, NIT or foot-Lambert.

Solutions in Audio & Video

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THE DISPLAY UNIT

Measuring of white balance on an LCD monitor by use of DK-Technoloiges LCD colour sensor.

Display unit
Type: 64 by 128 dot matrix LCD display with switchable back-lighting (auto switch-off function is provided)

Memory Positions
White references:
- 10 memories for white references
- Range for x and y: 0.2 to 0.6

Phosphor references:
- 30 memories for different colour references

Set-ups:
- 10 memories for different measuring set-ups.

Factory Programming
White references:
- D6500 (x=0.313, y=0.329)
- 3200K (x=0.423, y=0.399)
- 9300K (x=0.285, y=0.293)

Other white references may be stored by using the "Learn white reference" function. The numbers, as measurements, can also be input directly into the file.

Power Supply
Battery operated. Interchangeable NiCd rechargeable 7.2 V battery pack.

Consumption:
85 mA (illumination off)
115 mA (illumination on)

Operating time:
>5 h with fully charged battery

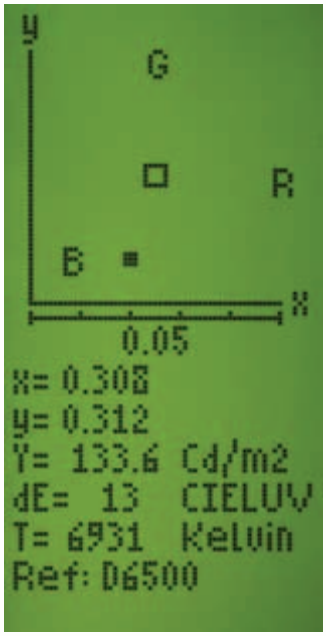
Battery charging time:
<14 h with instrument off

Mains voltage:
85-140 V AC or 187-250 V AC

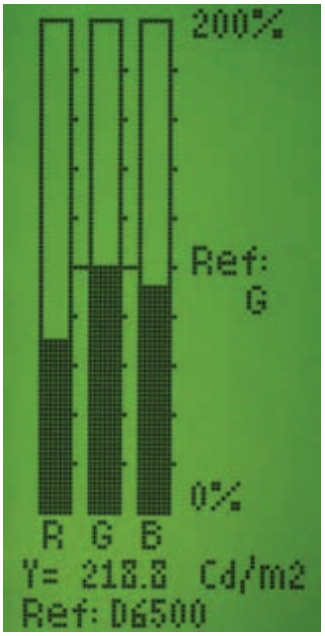
Consumption of charger:
< 6 VA

Frequency:
48 Hz to 65 Hz

DISPLAY MODES



The CIE display showing the measurement as x,y coordinates. The solid ball is the actual measurement, while the square is the target.



The RGB display showing the relative contribution of red, green, and blue pixels. With the monitor properly aligned the bars will be on line in the middle.

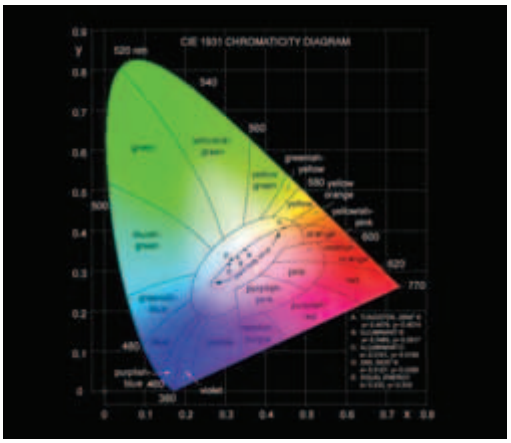
- **CIE xyY mode:**
  x and y coordinates are plotted in a CIE1931 xy diagram and shown numerically together with the correlated colour temperature and the colour error in CIELUV.

- **CIE u'v'Y mode:**
  u' and v' coordinates are plotted in a CIE1976 u'v' diagram and shown numerically together with the colour error in CIELUV.

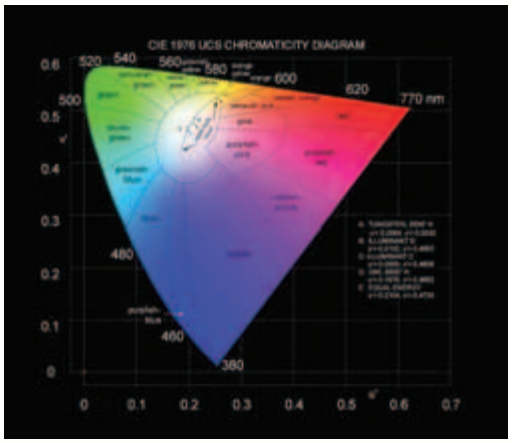
- **The ∂x ∂y and ∂u ∂v modes:**
  Give readouts of the difference between the measured and the reference chromaticity coordinates.

- **RGB mode:**
  Red, Green and Blue values are shown as bar graphs. The colour balance is displayed relative to a selected reference:
  - one of the bars,
  - the luminance,
  - an absolute level
  - relative to a previous measurement (memory location).

CIE 1931 CHROMACITY DIAGRAM



CIE 1978 UCS CHROMACITY DIAGRAM



CRT/LCD Colour Analyser

PM5639 KIT CRT/LCD - HARDWARE SPECIFICATIONS & ACCESSORIES

DK - Technologies

LCD COLOUR SENSOR

Measurement Range
- Luminance 1 to 1000 Cd/m² (0.3 to 300 FtL)
- x and y values 0.000 to 0.800
- Correlated Colour Temperature: 1900 K CCT to 12.000 K CCT
- Angle of aperture: ±10°
- Measuring distance: calibrated at 130mm.
- Luminance within ±2 Cd/m² in range 5 to 200 mm

Accuracy
The following specifications apply to a measurement with an illuminant D6500 standard monitor (1) at a luminance level of 80 Cd/m² (23.3 Ft.) and at a distance of 130 mm and at an ambient temperature of 15°C to 30°C (59°F to 86°F)
- Chromaticity (measured on white):
  Accuracy: ±0.002
  Repeatability: ±0.002
- Luminance
- Correlated colour temperature: ±50 K CCT
- Accuracy at reference distance: ±2% ±1 digit
  Repeatability: ±0.3% ±1 digit
- XYZ/RGB bars: ±1%
  Repeatability: ±1%
  Luminance(Y): ±2% ±1 digit

Measuring rate
When used with the display software: 3 and 10 measurements/second. When used with the communication modules: up to 15 measurements/second programmable.

(1) Calibration of the standard monitor is traceable to NIST USA with respect to chromaticity and to BIPM France with respect to luminance.

CRT COLOUR SENSOR

Measurement Range
- Luminance: 0.1 cd/m² to 1000 cd/m² (0.03 ftL to 300 ftL)
- x and y values: 0.000 to 0.800
- Correlated Colour Temperature: 1900 K to 12000 K

Accuracy
The following specifications apply to a measurement with an illuminant D6500, standard monitor (1), luminance 80 Cd/m² (23.3 ftL) in the temperature range 15°C to 30°C (59°F to 86°F)
- xy coordinates: better than ± 0.002
- u'v' coordinates: better than ± 0.002
- Repeatability: better than ± 0.002
- Luminance: better than ± 2%,± 1 digit
- Repeatability: better than ± 0.3%, ± 1 digit
- RGB bars: better than ± 1%
- Repeatability: better than ± 1%
- Correlated colour temperature: ± 50 K

Scan Rates
The CRT Colour Sensor automatically adjusts itself to the field scanning rate including HDTV and graphical systems.

(1) Calibration of the standard monitor is traceable to NIST USA with respect to chromaticity and to BIPM France with respect to luminance.

GENERAL SPECIFICATIONS

Environmental condition
- Operating temperature: 10°C to 40°C (50°F to 104°F) (non-condensing)
- Storage temperature: -10°C to 70°C (-14°F to 158°F) (non-condensing)

Mechanical data
LCD Colour Sensor
- Diameter of sensor: 40 mm (1.6")
- Length: 300 mm (11.8")
- Weight: 270 g (0.6 lbs)

CRT Colour Sensor
- Diameter of house: 108 mm (4.25")
- Diameter of suction pad: 120 mm (4.75")
- Height 133 mm (5.25")
- Weight: 250 g (0,55 lbs)

ORDERING INFORMATION

PM5639 FULL KIT
The PM5639 FULL KIT CRT/LCD Colour Analyser package includes:
- PM5639/94 LCD Colour Sensor
- PM5639/90 CRT Colour Sensor
- PM5639/80 Display Unit with Rechargeable Battery Pack
- Rubber hood
- Sensor stand
- Interconnection Cable between sensor and display unit
- 110V AC or 230V AC Battery Charger
- Operating Manual
- Wheeled flight case

PM5639 KIT LCD
The PM5639 KIT LCD Colour Analyser package includes:
- PM5639/94 LCD Colour Sensor
- PM5639/80 Display Unit with Rechargeable Battery Pack
- Rubber hood
- Sensor stand
- Interconnection Cable between sensor and display unit.
- 110V AC or 230V AC Battery Charger
- Operating Manual
- Wheeled flight case

PM5639/94 LCD COLOUR SENSOR
- LCD Colour Sensor

PM5639/06 CRT COLOUR SENSOR
- CRT Colour Sensor

PM5639 KIT CRT
The PM5639 KIT CRT Colour Analyser package includes:
- PM5639/90 CRT Colour Sensor
- PM5639/80 Display Unit with Rechargeable Battery Pack
- Interconnection Cable between sensor and display unit.
- 110V AC or 230V AC Battery Charger
- Operating Manual
- Wheeled flight case

RELATED PRODUCTS

PT5300
HD-SD VariTime™ Sync Generator base unit, 4 HD Tri-Level Sync outputs and 2 SD BB outputs, independently timeable, genlock to BB, subcarrier, 5 MHz and 10 MHz.

PT5202
Compact VariTime™ Sync Generator with genlock, 3 PAL/NTSC BB outputs, SD-SDI, PAL/NTSC video, and AES3/analogue audio outputs, 1U-half 19", incl. rack mount kit.

PT0760M
Multi-Channel HD/SD Wave Form Monitor including Analogue Reference Input, Vectorscope, Audio De-embeddiing, Simple bargraph metering & DVI/VGA Output.

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