FOR AUTOMATION OF CRT PRODUCTION LINES

An easy-to-use instrument for white-balance adjustment on CRT production lines, with color measurement and analyzer* functions plus data-communication capabilities

The Minolta CRT Color Analyzer CA-100 was designed to upgrade the white-balance process on production lines for color TV sets and computer color monitors in the CRT industry. The multi-function CA-100 reduces the time required for white-balance adjustment and inspection, and provides numerical values for white-balance control. It is even equipped with data-communication capabilities, allowing it to become part of a computerized quality-control system or even a fully automated production line. Continuing advances in consumer televisions, such as higher reliability, higher image quality, larger screens, and more features, plus the increased use of high-fidelity computer color monitors in image-control applications, make the color-reproduction characteristics of CRTs increasingly important. To ensure accurate color reproduction, white-balance adjustment must be performed utilizing a high-accuracy, high-reliability instrument: The Minolta CRT Color Analyzer CA-100. With a variety of internal features plus a wide range of optional accessories to provide additional functions, the CA-100 can be used to speed-up white-balance adjustment and inspection of many different kinds of CRTs. In addition, data communication and measurement control can be performed via an RS-232C or GP-IB* system, making it possible to use the CA-100 on a fully automated production line.

FEATURES

HIGH MEASUREMENT RATE

Any of four different synchronization modes can be selected to match the vertical scanning frequencies of different CRT systems.

<table>
<thead>
<tr>
<th>Synchronization mode</th>
<th>Measurement rate</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTSC</td>
<td>10 times/s</td>
<td>For measurements of NTSC-system televisions (vertical scanning rate: 60Hz)</td>
</tr>
<tr>
<td>PAL</td>
<td>8 times/s</td>
<td>For measurements of PAL- or SECAM-system televisions (vertical scanning rate: 50Hz)</td>
</tr>
<tr>
<td>EXT</td>
<td>7 times/s (for 60Hz synchronization signal)</td>
<td>For measurements utilizing an external synchronization (vertical scanning rate: 40 to 90Hz)</td>
</tr>
<tr>
<td>UNIV</td>
<td>5 times/s</td>
<td>For measurements of CRTs for which vertical scanning rate is uncertain and from which synchronization signal cannot be obtained</td>
</tr>
</tbody>
</table>

* Based on Minolta Standard Test Method

OTHER FEATURES

- Wide luminance measurement range of 0.20 to 999 cd/m²; (0.06 to 292 fL) allows measurement of virtually any CRT. Luminance units of cd/m² or fL can be changed by the user.
- Different memory channels (11 standard; expandable to 100 with optional card) can be used to store calibration values or standard colors for different CRT types. Each type can be labeled with a 10-character ID name for easy identification.
- Measurements can be displayed as xyY (colorimetric coordinates, luminance) or T ΔuvY (correlated color temperature, color difference from blackbody locus, luminance) values. Measured values are displayed both digitally and on LED analog scales.
- Range of LED analog display scales can be set by the user between 0.1 and 999%.
- A standard RS-232C interface is built into the CA-100 for outputting data to a separate computer or controlling the CA-100 from the computer.

WIDE RANGE OF OPTIONAL ACCESSORIES

- Memory cards:
  Memory Card CA-A14 or Multi-Probe Memory Card CA-A17 increase the number of memory channels to 100 from the standard 11.
- Analyzer cards:
  Analyzer Card-G CA-A15 and Multi-Probe Analyzer Card-G CA-A18 allow convenient white-balance adjustment based on a green standard; Analyzer Card-R CA-A16 and Multi-Probe Analyzer Card-R CA-A19 allow convenient white-balance adjustment based on a red standard. All Analyzer Cards also increase the number of memory channels to 100 from the standard 11.
- Multi-Probe Expansion Board CA-A13 allows the use of up to five measuring probes for simultaneous measurements of multiple points on CRT screen.
- Additional measuring probes are available. Measuring Probe CA-A10 has a 2m (6.6 ft.) cord; Measuring Probe CA-A12 has a 5m (16.4 ft.) cord.
- GP-IB Interface Board CA-A20 allows communication with other devices using a GP-IB (IEEE-488) system.

APPLICATIONS

- White-balance adjustment and inspection on CRT production lines
- Quality control and shipping inspection by CRT manufacturers
- Receiving inspection of CRTs by computer manufacturers
NAMES OF PARTS

Front View

1. **POWER switch**: Performs zero calibration when pressed after covering receptor area of measuring probe.
2. **0-CAL**: Performs zero calibration when pressed after covering receptor area of measuring probe.
3. **Liquid crystal display**: Displays a variety of information including memory channel, ID label, error messages, etc. depending on present status of CA-100.
4. **Display mode indications**: Indicates present display mode - xy, Y, T, W, or RBG.
5. **Digital display**: Displays measurement data in numerical form.
6. **Analog display**: Displays percent difference between measured value and standard color depending on present display mode.

Rear View

1. **Probe connector P1**: Connects to measuring probe.
2. **Luminance-unit selector switch**: cd/m² or ft can be selected.
3. **Baud-rate selector DIP switches**: Selects baud rate for RS-232C data communication.
4. **RS-232C connector**: Connects to an external synchronization-signal source for using EXT SYNC mode.
5. **Fuse holder**: Connects CA-100 to GP-IB system.
6. **AC input terminal**: Connects CA-100 to GP-IB system.

SPECTRAL SENSITIVITY

Colored lines indicate sensitivity of CA-100. Dashed lines (---) indicate CIE color-matching functions.
**Specifications**

- **Type:** CRT color analyzer
- **Luminance measuring range:** 0.20 to 999.00cd/m² or 0.061 to 2971L (DC), luminance units selectable via
  - switch on back panel
- **Display modes:** x, Y, T, x+y, Y mode standard, optional analyzer mode (green standard or red standard)
- **Syncrhonization modes:** NTSC, PAL, EXT, UNIV
- **Display values:**
  - Digital: x, y, u, v, Y, RGB
  - Analog: Δx, Δy, Y, R, G, B
- **Memory:** 11 channels, 100 channels with memory card or analyzer card
- **Accuracy:**
  - Y: ± 2% (1 digit)
  - x, y: ± 0.002
  - Measurement conditions: standard monitor, luminance > 100cd/m² or above
- **Repeatability:**
  - Y: ± 0.2% (1 digit)
  - x, y: ± 1% (2 digits) or 0.061cd/m² (Y > 300cd/m²)
  - ± 0.3% (1 digit) or 300cd/m² (Y ≤ 300cd/m²)
- **Measurement rate:** NTSC: 10 milliseconds
  - PAL: 8 milliseconds
  - EXT: 7 milliseconds (for 60Hz synchronization signal)
  - UNIV: 5 milliseconds
- **Other functions:**
  - Calibration to user-selected reference, storage of ID name, analyzer mode
  - Simultaneous measurements of multiple points
  - Variable analog display range
  - RS-232C interface baud rate: 200 to 92800bps, set to 9600bps at factory
  - GPIB interface (IEEE 488)
- **Operating temperature range:** 0 to 40°C (32 to 104°F), 85% humidity (at 35°C/95°F with no condensation)
- **Power:**
  - AC 100 to 220V, 50/60Hz, 40VA or AC 200 to 240V, 50/60Hz, 40VA
- **Dimensions:**
  - 400 x 140 x 260mm (15 3/4 x 5 1/2 x 10 1/4 in)
  - 5.5kg (12.1 lb)
- **Standard accessories:**
  - Measuring Probe CA-A10 (with 2m/6.6 ft cord), AC power cord, Measuring Probe Holder CA-A11, fuse (1), basic operation sheets (5)
- **Optional accessories:**
  - Multi-Probe Expansion Board CA-A13, GP-IB Interface Board CA-A20, Memory Card CA-A14, Multi-Probe Memory Card CA-A17, Analyzer Card G CA-A15, Analyzer Card R CA-A16, Multi-Probe Analyzer Card-G CA-A18, Multi-Probe Analyzer Card-R CA-A19

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**System Diagram**

[Diagram showing system components and connections]

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**Dimensions (Unit: mm)**

- Total length: 400mm
- Width: 260mm
- Height: 128mm

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**Minolta Camera Benelux B.V.**

**Minolta (Schweiz) AG**

**Minolta Hong Kong Limited**

**Minolta Singapore Pte. Ltd.**

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### Specifications

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<th>CRT color analyzer</th>
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<td>Luminance measuring range:</td>
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<td>Display modes:</td>
<td>xyY, TΔuvY modes standard; optional analyzer mode (green standard or red standard)*</td>
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<td>Synchronization modes:</td>
<td>NTSC; PAL; EXT; UNIV.</td>
</tr>
<tr>
<td>Display values:</td>
<td>Digital: xyY; TΔuvY; RBG *</td>
</tr>
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<td></td>
<td>Analog: Δx Δy ΔY; R/G, B/G, ΔG*; ΔR, B/R, G/R*</td>
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<td>Memory:</td>
<td>11 channels; 100 channels with memory card or analyzer card*</td>
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<td>xy: ±0.002</td>
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<td>Repeatability:</td>
<td>Y: ±0.3% ± 1 digit</td>
</tr>
<tr>
<td></td>
<td>xy: ±1% ± 1 digit (0.20cd/m² ≤ Y ≤ 3.00cd/m²)</td>
</tr>
<tr>
<td></td>
<td>±0.3% ± 1 digit (3.00cd/m² &lt; Y ≤ 999cd/m²)</td>
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<td>Measuring Probe CA-A10 (with 2m/6.6 ft. cord), Measuring Probe CA-A12 (with 5m/16.4 ft. cord), Multi-Probe Expansion Board CA-A13, GP-IB Interface Board CA-A20, Memory Card CA-A14, Multi-Probe Memory Card CA-A17, Analyzer Card-G CA-A15, Analyzer Card-R CA-A16, Multi-Probe Analyzer Card-G CA-A18, Multi-Probe Analyzer Card-R CA-A19</td>
</tr>
</tbody>
</table>

* Function available with optional accessory only.

Specifications subject to change without notice

### System Diagram

Measuring Probe CA-A10
(with 2m/6.6 ft. cord; standard)
Measuring Probe CA-A12
(with 5m/16.4 ft. cord; optional)