DMS 803
GONIOMETER SYSTEM FOR COMPLETE DISPLAY CHARACTERIZATION

Turnkey solution with motorized scanning for detailed electro-optical display characterization for quality control, research and development.

FEATURES
- 6 motorized axes for directional and lateral scanning, adjustment of height and light source inclination.
- Measurement and evaluation of emissive, transmissive, reflective, and transfective displays.
- For evaluation of all photometric and colorimetric characteristics versus viewing direction, electrical driving, time and temperature.
- Comprising electrical driving, illumination, computer and software.
- Fast photometer for analysis of temporal luminance variations (flicker evaluation, gray-to-gray transition times, etc.).
- DMSControl software for automated measurement sequences.
- ViPer software for analysis, evaluation and visualization of measurement data.

OPTIONS
- Spectrometer for radiometric, photometric and colorimetric analysis.
- Directional light sources for measurement of reflectance factor and in-plane BRDF.
- Forced air temperature control of the display under test.
- Interface for various video test-pattern generators.
MEASUREMENTS

- Angular scan: variation of luminance, contrast and chromaticity with viewing direction for evaluation of directional uniformities and BRDF.
- Area scan: scanning of display surface area for lateral uniformity evaluation.
- EOC: variation of luminance, contrast and chromaticity with electrical driving for evaluation of EOTF-characteristics (e.g. gamma).
- Transients: luminance versus time for e.g. response time evaluation.
- Reflectance characteristics under diffuse and directional illumination.
- Customer specific measurements defined with DCS scripting sequences.

SOFTWARE

Operation of the DMS series of instruments is supported by several Windows based software modules with graphical user interface.

- **DMSControl**
  DMSControl for DMS administration, definition and management of single measurements (e.g. angular scan, area scan, electro-optical transfer function (EOTF), cross talk, temporal response, etc.) and measurement sequences.

- **ViPer - VISUAL PERFORMANCE EVALUATION**
  ViPer Visual Performance Evaluation provides a range of versatile evaluation functions, a wide range of graphical representations of results, and data export capabilities.

- **DCS - DEVICE CONTROL SYSTEM**
  DCS Device Control System for integration of third party electronic devices. e.g. video test-pattern generators into the DMSControl software.
SYSTEM COMPONENTS

The following components and accessories are included in the DMS 803 standard scope of delivery, if not explicitly marked as optional components or accessories. See separate brochures for detailed information and specification data.

TEMPERATURE CONTROL

HCS 3 (optional): air-forced temperature control device, temperature range -40 °C to +85 °C, with integrated diffuse reflective illumination.

HCS 3A (optional): modified version of HCS-3 improved for easier handling, temperature range - 45 °C to +90 °C, adjustable DUT fixture.

LIGHT SOURCES AND ILLUMINATION SYSTEMS

HEL 4: two HEL 4 light sources (with halogenic incandescent lamps).

LC 8 (optional): xenon light source for higher light output.

DHS: diffusing hemisphere for evaluation of contrast of reflective displays.

DHS-HC (optional): diffusing hemisphere for evaluating the contrast of reflective displays; illumination geometry similar to HCS-3.

PID (optional): collimated parallel beam illumination.

VADIS (optional): variable aperture diffuse illumination source for e.g. scattering characterization of surfaces (BRDF), measurement of reflectance factor.

PLS (optional): LED point light source for measurement of reflectance characteristics including BRDF.

SDR (optional): integrating sphere for measurement of diffuse reflectance factor, specular component excluded or included (d/8, SCE or SCI).

LIGHT MEASURING DEVICES

PMT 3: fast photometer with photomultiplier tube, bandwidth 100 kHz, 500 kHz or 2 MHz.

CAS 140CT (optional): Model VIS; 360 to 830 nm; 1024 pixel back-illuminated CCD detector; 2.2 nm spectral resolution (100 μm slit); 0.5 nm/pixel data point interval (CAS140CT-151)
DUT DRIVING

ASG: Arbitrary Signal Generator with 1 or 4 analog output channels (*depending on basic system variant*). Standard and user defined signal waveforms. For direct addressing, passive matrix driving and control of TFT arrays (gate and data signals), etc. Power amplifiers are available for different voltage and current ranges.

**Source Meter (optional):** programmable current or voltage source with digital multimeter, in particular for current driven display devices like OLED displays. Can be combined with a multiplexer (for driving and measurement of displays with multiple segments and matrix displays).

**DCS (optional):** Device Control System for scripting and communication with various external devices (DCI), e.g. video pattern generators, module drivers, power supplies, etc. via RS232, GPIB, USB, or TCP/IP. Also used for definition of driving sequences for the Module Driving Interface (MDI) which is included for communication with display modules via serial, parallel or \( i^2 C \) interface.

SOFTWARE

**DMSControl:** Administration, configuration and control of the instrument, definition and management of measurements (single measurements and sequences).

**Visual Performance Evaluation (ViPer):** Evaluation and representation of measurement results (on and off-line), data exchange with other software (e.g. spreadsheet applications) and report generation (e.g. pdf-documents).

**Report Generator (optional):** User configurable data export from DMSControl to spreadsheet software.
## TECHNICAL DATA

### Motorized Axes

<table>
<thead>
<tr>
<th>Axis</th>
<th>Scan range</th>
<th>min. step size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclination Theta</td>
<td>0 … 90°</td>
<td>0.01°</td>
</tr>
<tr>
<td>Rotation Phi</td>
<td>0 … 360°</td>
<td>0.01°</td>
</tr>
<tr>
<td>Reflective illumination</td>
<td>0 … 90°</td>
<td>0.01°</td>
</tr>
<tr>
<td>x translation</td>
<td>-50 … +50 mm</td>
<td>0.01 mm</td>
</tr>
<tr>
<td>y translation</td>
<td>-50 … +50 mm</td>
<td>0.01 mm</td>
</tr>
<tr>
<td>z translation</td>
<td>0 … 250 mm</td>
<td>0.01 mm</td>
</tr>
</tbody>
</table>

Sphere of confusion (all axes) < 20 µm

### DUT dimensions

- Maximum diagonal: 600 mm / 24”
- Maximum thickness: 250 mm

### Dimensions

- DMS mechanism (L x W x H): 1430 mm x 980 mm x 1900 mm
- Light shielding box (integrated): 1430 mm x 980 mm x 1050 mm
- Electronics rack: 700 mm x 560 mm x 1250 mm (or 1050 mm depending on accessories)

### Mass

- Mechanism: 320 kg
- Electronics rack: 105 kg
- Light shielding box: 85 kg

All sizes and masses approximate values.

1 70° for all automated measurements, 90° for operator control.
### Facility requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains voltage</td>
<td>200 V – 240 VAC (230 V nominal)</td>
</tr>
<tr>
<td></td>
<td>50 Hz</td>
</tr>
<tr>
<td></td>
<td>1 phase</td>
</tr>
<tr>
<td>Max. mains current / fuse</td>
<td>30 A</td>
</tr>
<tr>
<td>Power consumption</td>
<td>appr. 880 W (DMS incl. PC, electronics rack, spectroradiometer and 2 x HEL 4 in operation)</td>
</tr>
</tbody>
</table>

### Ambient operating conditions

- **Ambient temperature**: 23 °C (±5 °C)
- **Humidity**: 40 – 60 % rel. humidity

### Arbitrary Signal Generator ASG

- **Number of channels**: 1 or 4
- **PA 3/60**: ±60 V / 200 mA
- **Rise time (-60 … +60 V)**: < 300 ns
- **Capacitive load (max.)**: 10 nF

### Photometer PMT 3

- **Bandwidth**: 100 kHz (standard)
- **Operating temperature**: 25 °C (±3 °C)
- **Measurement spot diameter**: 0.5, 1, 3, 8 mm
- **High speed analog-to-digital converter**: 12 bit AD converter
  sampling rate 2 MHz

### Spectrometer CAS 140CT

- **Spectral Range**: 360 … 830 nm
- **Spectral resolution**: 2.2 nm
- **Data point interval**: 0.5 nm
- **Measurement spot diameter**: 0.5, 1, 3, 8 mm

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2 DMS Control software range: 380 … 800 nm.

3 DMSControl datapoint interval: 1 nm.
DIMENSIONS AND FOOTPRINT

SCOPE OF DELIVERY

The basic system comprises the following components:

- DMS 803 goniometer mechanism
- Measurement Microscope with Viewfinder Optics
- Photometer PMT 3/100
- GRU with ASG 1 and power amplifier PA 3/60 (DMS 803-1) or
  GRU with 4 ASG and power amplifiers PA 3/60 (DMS 803-4).
- DHS
- 2 x HEL 4 light source for reflective and transmissive illumination
- PC with table
- Software package: DMS Control, ViPer
- Light shielding box
## ORDER INFORMATION

<table>
<thead>
<tr>
<th>Order number</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Basic System</strong></td>
<td></td>
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<tr>
<td>DMS-803-101</td>
<td>Model DMS 803-1 comprising: Goniometer with 6 motorized axes; Microscope viewing optics; Fast photometer PMT 3/100; 2 x HEL-4 light sources; Transmissive illumination; DHS diffuse-reflective source; GRU with ASG-1 (1 channel) and power amplifier PA 3/60; Light-shielding box; PC with table; DMSControl and ViPer software</td>
</tr>
<tr>
<td>DMS-803-401</td>
<td>Model DMS 803-4 comprising: Goniometer with 6 motorized axes; Microscope viewing optics; Fast photometer PMT 3/100; 2 x HEL-4 light sources; Transmissive illumination; DHS diffuse-reflective source; GRU with ASG-4 (4 channels) and power amplifiers PA 3/60; Light-shielding box; PC with table; DMSControl and ViPer software</td>
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**Options - Temperature control**

- DMS-3-10 HCS-3 temperature chamber with ThermoStream control unit
- DMS-3-20 HCS-3A temperature chamber with ThermoStream control unit

**Options - Light sources and illumination systems**

- DMS-5-10 HEL-4 light source with 150 W tungsten halogen lamp
- DMS-5-12 LC-8 Xenon light source for higher light output
- DMS-5-20 PID-800 parallel illumination device (collimated beam)
- DMS-5-30 VADIS-800 variable aperture diffuse illumination source for reflective measurement
- DMS-5-41 DHS-HC diffusing hemisphere for evaluating the contrast of reflective displays; illumination geometry similar to HCS-3 source
- DMS-5-50 SDR Integrating Sphere for Diffuse Reflectance
- DMS-5-60 PLS LED point-light source illumination for measurement of BRDF

**Options – Light Measuring Devices**

- DMS-1-10 CCD spectrometer set for DMS systems; incl. CAS 140CT VIS model (CAS 140CT-151) 360 nm – 830 nm

**Options – DUT driving**

- DMS-2-10 Keithley 2400 series source meter set for DMS, including cabling and interface

**Options – Software**

- DMS-SW-35 DCS Device Control System for external devices (for DMSControl); incl. DCI/MDI
- DMS-SW-40 Report generator for data export to Excel spread sheets

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