Consistency in Colour Measurement

Accurate, efficient automatic colorimeter

Lovibond® PFX195

Dark Oils & Fats
Liquid Chemicals & Industrial Oils
Petroleum Oils & Fuels
Beers, Malts & Caramels
Pharmaceutical Solutions
Industrial Oils & Surfactants
Sugar Solutions, Syrups & Honey
Optically Clear Samples
Waters & Waste Waters
Lovibond® PFX195 Automatic Transmittance Colorimeter

- Consistent and reliable colour data
- Extensive yet flexible choice of standard colour scales
- Remote upgrade facility for adding scales once in service
- Allows calculation and description of off-hue status
- Gives closest match to stored references
- Generates a customised colour scale from reference samples
- Robust steel construction with excellent chemical resistance
- Ability to handle hot samples with high melting points
- Easy maintenance with removable sample chamber
- Includes a certified reference standard for conformance checks
- Supplied with colour control software for data analysis
- Output conforming to GLP including date, time, sample & user ID
- Accommodates a range of sample cells and tubes

Objective Colour Data at an Affordable Price

The Lovibond® PFX195 is an economical colorimeter for optically clear samples that meets the demand for consistent and reliable colour data. It removes all subjectivity involved in colour grading, supplying unbiased readings that are unaffected by operator or environment.

Comprehensive Selection of Standard Colour Values

PFX195 colorimeters automatically measure colour and display the results directly, either according to the traditional grading scales that have been widely adopted as industry standards for colour assessment and control, or in terms of internationally recognised CIE values and spectral data:

<table>
<thead>
<tr>
<th>Colour Scale</th>
<th>References</th>
<th>Scope</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADMI (full spectrum and tristimulus filter)</td>
<td>American Standard Methods 2100 E</td>
<td>Coloured waters and tinted liquids</td>
<td></td>
</tr>
<tr>
<td>Acid Wash Colour</td>
<td>ASTM D464</td>
<td>Quality testing of industrial aromatic hydrocarbons</td>
<td></td>
</tr>
<tr>
<td>ASBC Color</td>
<td>American standard for colour grading of beers; derived from EBC Colour</td>
<td>1.2 - 10 (extended range by dilution and reduction in path length)</td>
<td></td>
</tr>
<tr>
<td>ASTM Color</td>
<td>ASTM D1500, D6045, ISO 2049</td>
<td>A wide range of petroleum products including lubricating oils, heating oils and diesel fuel oils</td>
<td>0.5 - 8 units</td>
</tr>
<tr>
<td>Chinese Pharmacopoeia Colour Series</td>
<td>CP Appendix IX A</td>
<td>Pharmaceutical solutions</td>
<td>YGI = 10; Y1 = 10; OY1 = 10; OR1 = 10; BRI = 10</td>
</tr>
<tr>
<td>EBC Colour</td>
<td>Analytica</td>
<td>Beers, malts and caramels and similarly coloured liquids. Based either on absorption at 430 nm or CIE x y chromaticity co-ordinates</td>
<td>2 - 27 units (extended range by dilution and reduction in path length)</td>
</tr>
<tr>
<td>European Pharmacopoeia Colour Series</td>
<td>Ph. Eur. Method 2.2.2</td>
<td>Pharmaceutical solutions</td>
<td>R1 - 7; T1 - 7; B1 - 9; BY1 - 7; GY1 - 7</td>
</tr>
<tr>
<td>FAC Colour</td>
<td>AOCS Cc 13a-43</td>
<td>Approved by the Fats Analysis Committee of the American Oil Chemists Society for grading dark coloured oils, fats and tallow.</td>
<td>1 - 45 (odd numbers)</td>
</tr>
<tr>
<td>Gardner Colour</td>
<td>ASTM D1544, D6166, AOCS Td 1a,</td>
<td>Chemicals and oils ranging from pale yellow to red, such as resins, varnishes, drying oils, lecithins and fatty acids</td>
<td>1 - 18 units</td>
</tr>
<tr>
<td>Hess-Ives Colour Units</td>
<td>DGK F050.2</td>
<td>Chemicals and surfactant liquids</td>
<td></td>
</tr>
<tr>
<td>Honey Colour (Pfund Equivalents)</td>
<td>Commercial honeys, ranging from pale yellow through amber to deep red</td>
<td>0 - 115 mm</td>
<td></td>
</tr>
<tr>
<td>ICUMSA Colour</td>
<td>ICUMSA GSI-7, ICUMSA GS23/3-9</td>
<td>Sugar solutions &amp; syrups</td>
<td></td>
</tr>
<tr>
<td>Iodine Colour</td>
<td>DIN 6162</td>
<td>Solvents, plasticisers, resins, oils and fatty acids ranging from yellow to brown</td>
<td>1 - 500 units</td>
</tr>
<tr>
<td>Klett Colour (blue filter KS-42)</td>
<td>AOCS Dd 5-92</td>
<td>Detergents and surfactants</td>
<td>0 - 1000 units</td>
</tr>
<tr>
<td>Pt-Co/Hazen/APHA Scale</td>
<td>ASTM D1209, D5386</td>
<td>Water and other clear liquids such as plasticisers, solvents and petroleum spirits</td>
<td>0 - 500 mg PCl</td>
</tr>
<tr>
<td>Rosin, US Naval Stores</td>
<td>ASTM D509</td>
<td>Rosins varying in colour from yellow to reddish orange</td>
<td>XC - D + FF</td>
</tr>
<tr>
<td>Soybalt Colour</td>
<td>ASTM D156, D6045, JIS K 2580</td>
<td>Light coloured petroleum products including aviation fuels, kerosine, white mineral oils, hydrocarbon solvents and petroleum waxes</td>
<td>+16 (darkest) to +30 (lightest)</td>
</tr>
<tr>
<td>Series 52 (Brown)</td>
<td>Beers, whiskies and sugar solutions</td>
<td>1 - 38 units</td>
<td></td>
</tr>
<tr>
<td>Yellowness Index</td>
<td>ASTM D1925, E 313</td>
<td>Determination of the degree of yellowness under daylight illumination. Calculated from X Y Z tristimulus values</td>
<td></td>
</tr>
<tr>
<td>US Pharmacopoeia Color</td>
<td>USP (631) Color and Achromaticity</td>
<td>Pharmaceutical solutions</td>
<td>A - T</td>
</tr>
<tr>
<td>CIE Values</td>
<td>ASTM E308</td>
<td>X Y Z tristimulus values; x y chromaticity co-ordinates; CIE L<em>a</em>b* colourspace; ∆E colour difference; L<em>C</em>h colour space; Hunter L a b colour space</td>
<td>Defined by spectrum locus</td>
</tr>
<tr>
<td>Spectral data (420 - 710 nm)</td>
<td>Transmittance (full spectrum and at specified wavelengths)</td>
<td>Optical density (full spectrum and at specified wavelengths)</td>
<td>0 - 100%</td>
</tr>
</tbody>
</table>

1) These scales are not included on standard instrument versions but are available as a colour scale upgrade
2) included as standard on PFX195C only
**Versatile and Flexible Application**

The Lovibond® PFX195 is configured as a series of industry-focused instruments, each including the principal colour scales used in that sector:

<table>
<thead>
<tr>
<th>Version</th>
<th>Application</th>
<th>Standard Colour Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFX195/1</td>
<td>Liquid chemicals &amp; industrial oils</td>
<td>Pt-Co/Hazen/APH, Gardner, Iodine, CIE values, spectral data</td>
</tr>
<tr>
<td>PFX195/2</td>
<td>Petroleum oils &amp; fuels</td>
<td>Saybolt, ASTM Color, Pt-Co/Hazen/APH, CIE values, spectral data</td>
</tr>
<tr>
<td>PFX195/3</td>
<td>Dark oils &amp; fats</td>
<td>FAC, Gardner, CIE values, spectral data</td>
</tr>
<tr>
<td>PFX195/4</td>
<td>Beers, malts &amp; caramels</td>
<td>EBC (CIE &amp; 430 nm), ASBC (CIE &amp; 430 nm), Series 52 (Brown), CIE values, spectral data</td>
</tr>
<tr>
<td>PFX195/5</td>
<td>Pharmaceutical solutions</td>
<td>European Pharmacopoeia (includes automatic selection of colour series), US Pharmacopoeia, Pt-Co/Hazen/APH, CIE values, spectral data</td>
</tr>
<tr>
<td>PFX195/6</td>
<td>Industrial oils &amp; surfactants</td>
<td>Klett Colour (blue filter KS-42), Pt-Co/Hazen/APH, Hess-Ives Colour Units, CIE values, spectral data</td>
</tr>
<tr>
<td>PFX195/7</td>
<td>Sugar solutions, syrups &amp; honey</td>
<td>ICUMSA Colour (420, 560, 710 nm), Honey Colour (Pfund Equivalents), Series 52 (Brown), CIE values, spectral data</td>
</tr>
<tr>
<td>AquaTint</td>
<td>Waters &amp; waste waters</td>
<td>ADMI (spectral &amp; tristimulus filter methods), Pt-Co/Hazen/APH, CIE values, spectral data</td>
</tr>
<tr>
<td>PFX195C</td>
<td>Transparent samples</td>
<td>CIE values (standard selection), L<em>C</em>h colour space, Hunter L a b colour space, spectral data</td>
</tr>
</tbody>
</table>

Colour scale upgrades give the flexibility to meet individual requirements, enabling additional colour scales to be added to standard instrument versions, either at the time of order or remotely once the instrument is in service. For product types that are incompatible with standard colour scales, the PFX195 allows users to build up a customised scale from a series of reference samples and then to obtain a closest match to the stored references.

**Colour Testing Made Simple**

The Lovibond® PFX195 is an easy to use, automatic instrument that requires no special skills to operate. The built-in menu guides users through the selection of operating parameters such as colour scale. Thereafter, readings are made with a single key press, taking less than 25 seconds to complete.

**Easily Customised to User Specifications**

Adaptable software and design allow users to configure the PFX195 to their requirements. Operators can set the language for display, program the PFX195 to show only those scales of interest or restrict access to the menu system. As well as standard colorimetry cells, the PFX195 can be used with a range of tubes and standard, flow-through and disposable spectrophotometer cells.

**Calculation and Description of Off-Hue Status**

The PFX195 off-hue status is a useful facility that reveals whether the sample colour is characteristic of the selected scale. It includes a description of hue difference (eg. redder, greener), relative saturation (stronger or weaker) and an off-hue factor (a relative measure of the distance away in colour space of the sample colour from the ‘true’ colour scale).

**Suited to Laboratory or Production Environments**

Comprehensive facilities for colour management make the Lovibond® PFX195 an ideal choice for the laboratory. However, with excellent calibration stability, password protection for tamper proof control and simple operation, the PFX195 also supports the migration of quality control to the manufacturing area, making it a cost-effective option for dedicated production testing. For easy maintenance, the Lovibond® PFX195 includes a robust steel sample chamber, which is simply removed and cleaned if a spillage occurs, and the precision filament lamp is easily assessed and changed from outside the instrument.

**Optimised Use of Colour Data**

Data sets can be saved in the instrument, printed out or automatically downloaded to a PC computer where they can be processed and stored for future analysis, traceability and monitoring trends. The colour control software supplied with the PFX195 enables the generation of spectral and CIE diagrams as well as analysis of spectral data. It also permits direct control of the instrument from the computer.

**Confidence in Colour Measurement**

For regular conformance checking each PFX195 is provided with a calibrated glass filter of known colour value. Sets of conformance filters and certified colour reference solutions are also available for routine calibration and verification of test data. Conformance filters are supplied with a Certificate of Conformity stating their colour values and confirming that they have been manufactured and inspected under the control of Tintometer’s ISO 9001: 2000 quality system. Certified colour reference solutions are supplied with full traceability to internationally recognised standards, either ISO/IEC 17025:2000 (ASTM Color, Saybolt and Gardner Colour) or the ISO 9001: 2000 quality system (Pt-Co Units).
**Technical Specification**

Measuring principle: 9 interference filters

Spectral response: 420 - 710 nm

Bandwidth: 20 nm

Repeatability:
- Chromaticity (x y) ± 0.0004
- Transmittance: ± 0.5%

Measurement time: Less than 25 seconds

Calibration: Single key press; fully automated

Light source: 5 Volt, 10 Watt tungsten halogen lamp (lens ended)

Illuminant: CIE Illuminant A, C, D65 (B for PFX195/4)

Observer: 2°, 10°

Path length: 0.1 - 50 mm

Interfaces: Parallel printer port, RS 232 port

Data storage: Up to 32 data sets

Input voltage: Universal (190 - 240V), via external power supply

Data storage: Up to 32 data sets

Accuracies supplied:

**Accessories supplied**

Each Lovibond® PFX195 is supplied complete with Windows® software, optical glass cells for the colour scales included, a certified glass filter of specified colour value for regular conformance testing, a spare lamp and instructions.

**Measurement Principle**

9 interference filters

**Spectral Response**

420 - 710 nm

**Bandwidth**

20 nm

**Repeatability**

- Chromaticity (x y) ± 0.0004
- Transmittance: ± 0.5%

**Measurement Time**

Less than 25 seconds

**Calibration**

Single key press; fully automated

**Light Source**

5 Volt, 10 Watt tungsten halogen lamp (lens ended)

**Illuminant**

CIE Illuminant A, C, D65 (B for PFX195/4)

**Observer**

2°, 10°

**Path Length**

0.1 - 50 mm

**Interfaces**

Parallel printer port, RS 232 port

**Data Storage**

Up to 32 data sets

**Input Voltage**

Universal (190 - 240V), via external power supply

**Accessories Supplied**

Each Lovibond® PFX195 is supplied complete with Windows® software, optical glass cells for the colour scales included, a certified glass filter of specified colour value for regular conformance testing, a spare lamp and instructions.

**Certified Reference Materials, 500 ml (nominal values quoted)**

- **ASTM Color**, set of 3 filters (0.5, 3.5, 5.0)
  - 13 95 10
- **EBC Colour**, set of 5 filters (4.9, 5.5, 18, 25)
  - 13 94 00
- **FACT Colour**, set of 5 filters (7, 13, 15, 29, 39)
  - 13 97 00
- **Gardner Colour**, set of 4 filters (2, 8, 12, 17)
  - 13 95 60
- **EP Red**, set of 2 filters (R2, R6)
  - 13 94 10
- **EP Yellow**, set of 2 filters (Y2, Y4)
  - 13 94 20
- **EP Brown/Yellow**, set of 2 filters (BY3, BY5)
  - 13 94 40
- **EP Green/Yellow**, set of 2 filters (GY2, GY5)
  - 13 94 50
- **Honey Colour (Pfund Equivalents)**, set of 5 filters (15, 30, 60, 85, 100)
  - 13 93 70
- **Klett Colour (blue filter KS-42)**, set of 5 filters (21, 66, 162, 318, 616)
  - 13 97 10
- **Pt-Co/Hazen/APHA scale**, set of 5 filters (5, 20, 50, 100, 300)
  - 13 94 30
- **Saybolt Colour**, set of 5 filters (-8, 0, +10, +18, +25)
  - 13 93 90
- **US Pharmacopoeia**, set of 3 filters (G, H, P)
  - 13 94 60
- **Single Filter**, certified (select scale & nominal value from above)
  - 10 99 70
- **User specified filter** (select scale and value)
  - 10 99 80

**Spares & Optional Accessories**

- **4 - 20 mA adaptor, 4 channels**
  - (please request details)

**For information on colour measurement, visit our website at www.tintometer.com**

**ORDERING INFORMATION**

**PFX195 Instruments**

- **PFX195/1** (Pt-Co, Gardner, Loinde)
  - 13 19 51
- **PFX195/2** (Saybolt, ASTM Color, Pt-Co)
  - 13 19 52
- **PFX195/3** (FAC, Gardner)
  - 13 19 53
- **PFX195/4** (EBC (CIE & 430 nm), ASBC (CIE & 430 nm), Series 52)
  - 13 19 54
- **PFX195/5** (EP Colour (includes auto selection), USP, Pt-Co)
  - 13 19 55
- **PFX195/6** (Klett Colour (blue filter KS-42), Pt-Co, Hess-Ives)
  - 13 19 56
- **PFX195/7** (ICUMSA (420, 560, 710 nm), Honey Colour, Series 52)
  - 13 19 57
- **AquaTint (ADM) (spectral & tristimulus filter methods)**, Pt-Co
  - 13 19 59
- **PFX195C** (full range of CIE values)
  - 13 19 58

**Colour Scale Upgrades (include required cell)**

- **Acid Wash Colour** (ASTM D848)
  - 13 29 50
- **ASTM Color**
  - 13 28 40
- **Chinese Pharmacopoeia**
  - 13 28 50
- **Gardner Colour**
  - 13 28 60
- **Hess-Ives Colour Units**
  - 13 28 70
- **Klett Colour (blue filter KS-42)**, ordered with instrument only
  - 13 29 30
- **Pt-Co/Hazen/APHA scale**
  - 13 28 80
- **Rosin, US Naval Stores**
  - 13 28 90
- **Saybolt Colour**
  - 13 29 00
- **Yellowness Index**
  - 13 29 10
- **CIE L*a*b**
  - 13 29 20

**Accessories & Optional Accessories**

- **PFX195 Lamp 5 V**
  - 13 81 80
- **Replacement sample chamber**
  - 13 28 30
- **Helder for standard spectrophotometer cells** (12.5 mm width)
  - 13 19 07
- **Adapter for 10.65 mm tubes**
  - 13 28 00
- **Adapter for 33 mm tubes**
  - 13 28 10
- **Tube, 10.65 mm diameter**
  - 35 22 90
- **Tube, 33 mm diameter for ASTM Color**
  - 35 22 00
- **Acid Wash Tube**
  - 35 22 20
- **Dark sample cell for CIE Values, 1 mm path length (W600/OG/10 mm cell with a 9 mm spacer)**
  - 13 28 20
- **Plastic, disposable cells, 10 mm path length, pack of 100**
  - 13 27 70
- **Plastic, disposable cells + lids, 50 mm path length, pack of 10**
  - 13 27 80
- **Plastic, disposable cells, 50 mm path length, pack of 50**
  - 13 27 90
- **Flow through control software** (for use with PC)
  - 13 29 40
- **Flow through cell, 50 mm path length**
  - 65 80 10
- **Flow through cell, 10 mm path length**
  - 65 80 20
- **PFX195 IQ/OQ Documentation**
  - 13 22 00

**Ordering Information**

**Order Code**

- **PFX195/1** (Pt-Co, Gardner, Loinde)
  - 13 19 51
- **PFX195/2** (Saybolt, ASTM Color, Pt-Co)
  - 13 19 52
- **PFX195/3** (FAC, Gardner)
  - 13 19 53
- **PFX195/4** (EBC (CIE & 430 nm), ASBC (CIE & 430 nm), Series 52)
  - 13 19 54
- **PFX195/5** (EP Colour (includes auto selection), USP, Pt-Co)
  - 13 19 55
- **PFX195/6** (Klett Colour (blue filter KS-42), Pt-Co, Hess-Ives)
  - 13 19 56
- **PFX195/7** (ICUMSA (420, 560, 710 nm), Honey Colour, Series 52)
  - 13 19 57
- **AquaTint (ADM) (spectral & tristimulus filter methods)**, Pt-Co
  - 13 19 59
- **PFX195C** (full range of CIE values)
  - 13 19 58