Lovibond® Colour Measurement

Tintometer® Group

Colour Management for Industry

Lovibond® PFX*i*-195 Series

Dark Oils & Fats • Liquid Chemicals & Industrial Oils
Petroleum Oils & Fuels • Beers, Malts & Caramels • Pharmaceutical Solutions
Industrial Oil & Surfactants • Sugar Solutions, Syrups & Honey
Optically Clear Samples • Water & Waste Waters

Accurate, efficient spectrophotometric colorimeters

www.lovibondcolour.com

Lovibond® PFX*i*-195 Series

- RCMSi Remote Calibration & Maintenance Service via internet
- USB & LAN Interface
- Large clear LCD screen for ease of use and ability to display graphs and data in a wide variety of languages
- 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
- Easy maintenance with removable sample chamber
- 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 for Process Control

The Lovibond® PFX*i*-195 Series is a highly efficient 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

The PFX*i*-195 Series of 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.

Colour Scale	References	Scope	Range
ADMI (full spectrum and tristimulus filter)	American Standard Methods 2120 E	Coloured waters and tinted liquids	1 – 500
Acid Wash Color	ASTM D848	Quality testing of industrial aromatic hydrocarbons	1 – 14
ASBC		American standard for colour grading of beers; derived from EBC Colour	1.2 – 10.6 (extended range by dilution and reduction in path length)
ASTM Color	ASTM D1500, D6045, ISO 2049	A wide range of petroleum products including lubricating oils, heating oils and diesel fuel oils	0.5 – 8 units
Chinese Pharmacopoeia Colour Series[1)]	CP Appendix IX A	Pharmaceutical solutions	YG1 – 10; Y1 – 10; OY – 10; OR1 – 10; BR1 – 10
EBC Colour	Analytica	Beers, malts and caramels and similarly coloured liquids. Based either on absorption at 430 nm or CIE x y chromaticity co-ordinates	2 – 27 units (extended range by dilution and reduction in path length)
European Pharmacopoeia Colour Series	Ph. Eur. Method 2.2.2	Pharmaceutical solutions	R1 – 7; Y1 – 7; B1 – 9; BY1 – 7; GY1 – 7
FAC Color	AOCS Cc 13a-43	Approved by the Fats Analysis Committee of the American Oil Chemists Society for grading dark coloured oils, fats and tallows.	1 – 45 (odd numbers)
Gardner Color	ASTM D1544, D6166, AOCS Td 1a,	Chemicals and oils ranging from pale yellow to red, such as resins, varnishes, drying oils, lecithins and fatty acids	1 – 18 units
Hess-Ives Color Units	DGK F050.2	Chemicals and surfactant liquids	
Honey Colour (Pfund Equivalents)		Commercial honeys, ranging from pale yellow through amber to deep red	0 – 115 mm Pfund
ICUMSA Colour	ICUMSA GS1-7, ICUMSA GS2/3-9	Sugar solutions & syrups	
Iodine Colour	DIN 6162	Solvents, plasticisers, resins, oils and fatty acids ranging from yellow to brown	1 – 500 units
Klett Color (blue filter KS-42)	AOCS Dd 5-92	Detergents and surfactants	0 – 1000 units
Pt-Co/Hazen/APHA Scale	ASTM D1209, D5386	Water and other clear liquids such as plasticisers, solvents and petroleum spirits	0 – 500 mg Pt/l
Rosin, US Naval Stores[1)]	ASTM D509	Rosins varying in colour from yellow to reddish orange	XC – D + FF
Saybolt Color	ASTM D156, D6045, JIS K 2580	Light coloured petroleum products including aviation fuels, kerosine, white mineral oils, hydrocarbon solvents and petroleum waxes	–16 (darkest) to +30 (lightest)
Series 52 (Brown)		Beers, whiskies and sugar solutions	1– 38 units
Yellowness Index[1)]	ASTM D1925, E 313	Determination of the degree of yellowness under daylight illumination. Calculated from X Y Z tristimulus values	
US Pharmacopoeia Color	USP (631) Color and Achromicity	Pharmaceutical solutions	A – T
CIE Values	ASTM E308	X Y Z tristimulus values; x y Y chromaticity co-ordinates; CIE L*a*b* colourspace; ΔE colour difference; L*C*h colour space[2)], Hunter L a b colour space[2)]	Defined by spectrum locus
Spectral data (420 – 710 nm)		Transmittance (full spectrum and at specified wavelengths) Optical density (full spectrum and at specified wavelengths)	0 – 100% 0 – 2.5

[1)] These scales are not included on standard instrument versions but are available as a colour scale upgrade
[2)] included as standard on PFX*i*-195/9 only

Version	Application	Standard Colour Scales
PFX*i*-195/1	Liquid chemicals & industrial oils	Pt-Co/Hazen/APHA, Gardner, Iodine, CIE values, spectral data
PFX*i*-195/2	Petroleum oils & fuels	Saybolt, ASTM Color, Pt-Co/Hazen/APHA, CIE values, spectral data
PFX*i*-195/3	Dark oils & fats	FAC, Gardner, CIE values, spectral data
PFX*i*-195/4	Beers, malts & caramels	EBC (CIE & 430 nm), ASBC (CIE & 430 nm), Series 52 (Brown), CIE values, spectral data
PFX*i*-195/5	Pharmaceutical solutions	European Pharmacopoeia (includes automatic selection of colour series), US Pharmacopoeia, Pt-Co/Hazen/APHA, CIE values, spectral data
PFX*i*-195/6	Industrial oils & surfactants	Klett Color (blue filter KS-42), Pt-Co/Hazen/APHA, Hess-Ives Color Units, CIE values, spectral data
PFX*i*-195/7	Sugar solutions, syrups & honey	ICUMSA Colour (420, 560, 710 nm), Honey Colour (Pfund Equivalents), Series 52 (Brown), CIE values, spectral data
PFX*i*-195/8	Waters & waste waters	ADMI (spectral & tristimulus filter methods), Pt-Co/Hazen/APHA, CIE values, spectral data
PFX*i*-195/9	Transparent samples	CIE values (standard selection), L*C*h colour space, Hunter L a b colour space, spectral data

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 PFX*i*-195 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.

RCMSi Technology (Remote Calibration & Maintenance Service via internet)

The PFX*i* range includes new RCMSi technology (Remote Calibration & Maintenance Service via internet). This unique feature allows a calibrated measurement to be taken using an ISO 17025 certified liquid standard. The spectral response is transmitted to the Lovibond® secure calibration server. On completion of this procedure, a traceable calibration certificate is made electronically available to the user. The RCMSi system not only gives the user added confidence that the instrument is working within tight ISO standards but also reduces the need for expensive on-site servicing and preventative maintenance of the unit.

Colour Testing Made Simple

The PFX*i*-195 Series provides easy to use, automatic instruments that require 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 20 seconds to complete. Built-in help files are available.

Easily Customised to User Specifications

Adaptable software and design allow users to configure the PFX*i*-195 Series to their requirements. Operators can set the language for display, program the PFX*i*-195 to show only those scales of interest or restrict access to the menu system. As well as standard colorimetry cells, the PFX*i*-195 can be used with a range of tubes and standard, flow-through and disposable spectrophotometer cells.

Calculation and Description of Off-Hue Status

The PFX*i*-195 off-hue status is a useful facility that reveals whether the sample colour is characteristic of the selected scale. Where appropriate, 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 PFX*i*-195 Series an ideal choice for the laboratory. However, with excellent calibration stability, password protection for tamper proof control and simple operation, the PFX*i*-195 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® PFX*i*-195 Series includes a robust steel sample chamber, which is simply removed and cleaned if a spillage occurs, and the precision filament lamp is easily accessed 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 where they can be processed and stored for future analysis, traceability and trend monitoring. The colour control software supplied with the PFX*i*-195 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, certified colour reference standards 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 The Tintometer Ltd's ISO 9001 quality system. Certified colour reference standards are supplied with full traceability to internationally recognised standards, either ISO/IEC 17025 (ASTM Color, Saybolt and Gardner Color) or the ISO 9001 quality system (Pt-Co Units).

Lovibond® PFX*i*-195

PFX*i*–195 Technical Specification

Measuring principle	9 interference filters
Spectral response	420 – 710 nm
Bandwidth	10 nm
Repeatability	on measurements of de-ionised water
Chromaticity (x y)	+/– 0.0004
ΔE	0.4
Measurement time	Less than 30 seconds
Baseline calibration	Single key press; fully automated
Light source	5 Volt, 10 Watt Tungsten Halogen
Illuminants	CIE Illuminant A, B, C, D65
Observer	2°, 10°
Path length	0.1 – 50 mm
Interfaces	USB, LAN, RS232
Data storage	100,000+ Measurements
Input voltage	Universal (90 – 240 Vac), via external power supply
Compliance	CE, RoHS, WEEE
Display	240 x 128, back-lit graphic display, (white on blue)
Keypad	23 key tactile membrane keypad; washable polyester with audible feedback
Languages	English, French, German, Italian, Portuguese, Russian, Spanish, Chinese and Japanese
Instrument housing	Fabricated steel with tough, textured paint finish
Dimensions	Width 435, depth 195, height 170 (mm)
Weight	6.8 kg

Accessories

Version	Optical Glass Cells
PFX*i*-195/1	1 x 10 mm, 1 x 50 mm
PFX*i*-195/2	1 x 33 mm, 1 x 50 mm
PFX*i*-195/3	1 x 10 mm
PFX*i*-195/4	1 x 10 mm, 1 x 25 mm
PFX*i*-195/5	1 x 40 mm, 1 x 50 mm
PFX*i*-195/6	1 x 10 mm, 1 x 40 mm, 1 x 50 mm
PFX*i*-195/7	1 x 10 mm, 1 x 50 mm
PFX*i*-195/8	1 x 10 mm, 1 x 50 mm
PFX*i*-195/9	1 x 10 mm

* Whenever cells are subjected to thermal shock, only borosilicate glass cells should be used.

Ordering Information

	Order Code
PFX*i*-195 Instruments	
PFX*i*-195/1 (Pt-Co, Gardner, Iodine)	1371951
PFX*i*-195/2 (Saybolt, ASTM Color, Pt-Co)	1371952
PFX*i*-195/3 (FAC, Gardner)	1371953
PFX*i*-195/4 (EBC (CIE & 430 nm), ASBC (CIE & 430 nm), Series 52)	1371954
PFX*i*-195/5 (EP Colour (includes auto selection), USP, Pt-Co)	1371955
PFX*i*-195/6 (Klett Color (blue filter KS-42), Pt-Co, Hess-Ives)	1371956
PFX*i*-195/7 (ICUMSA (420, 560, 710 nm), Honey Colour, Series 52)	1371957
PFX*i*-195/8 (ADMI (spectral & tristimulus filter methods), Pt-Co)	1371958
PFX*i*-195/9 (full range of CIE values)	1371959

Colour Scale Upgrades (include required cell)

Acid Wash Color (ASTM D848)	132950
ASTM Color	132840
Chinese Pharmacopoeia	132850
Gardner Color	132860
Klett Color (blue filter KS-42); order with instrument only	132930
Pt-Co/Hazen/APHA scale	132880
Rosin, US Naval Stores	132890
Saybolt Colour	132900
Yellowness Index	132910
CIE L*C*h	132920

Many other Scale Upgrades are available.

Spares & Optional Accessories

PFX*i*-195 Lamp 5V	138180
Replacement sample chamber	133830
Holder for standard spectrophotometer cells (12.5 mm width)	131907
Adapter for 10.65 mm tubes	132800
Adapter for 33 mm tubes	132810
Tube, 10.65 mm diameter	352290
Tube, 33 mm diameter for ASTM Color	352300
Acid Wash Tube	352220
Dark sample cell for CIE Values, 1 mm path length (W600/OG/10 mm cell with a 9 mm spacer)	132820
Plastic, disposable cells, 10 mm path length, pack of 100 *	132770
Plastic, disposable cells, 33 mm path length, pack of 50 *	352091
Plastic, disposable cells, 50 mm path length, pack of 50 *	352101
Flow through control software (for use with PC)	137690
Flow through cell, 50 mm path length *	658010
Flow through cell, 10 mm path length *	658020
PFX*i*-195 IQ/OQ Documentation	137680

* For use with holder for standard spectrophotometer cells

Conformance Filters (nominal values quoted)

EBC Colour, set of 5 filters (4, 9.5, 15, 18, 25)	139400
FAC Color, set of 5 filters (7, 13, 15, 29, 39)	139700
EP Red, set of 2 filters (R2, R6)	139410
EP Yellow, set of 2 filters (Y2, Y4)	139420
EP Brown, set of 2 filters (B2, B5)	139430
EP Brown/Yellow, set of 2 filters (BY3, BY5)	139440
EP Green/Yellow, set of 2 filters (GY2, GY5)	139450
Honey Colour (Pfund Equivalents), set of 5 filters (15, 30, 60, 85, 100)	139370
Klett (blue filter KS-42), set of 5 filters (21, 66, 162, 318, 616)	139710
US Pharmacopoeia, set of 3 filters (G, H, P)	139460
Single filter, certificated (select scale & nominal value from above)	109970
User specified filter (specify scale and value)	109980

Certified Reference Materials, 500 ml (nominal values quoted)

ASTM Color <0.5, (certified to ISO/IEC 17025)	134290
ASTM Color 1, (certified to ISO/IEC 17025)	134000
ASTM Color 3, (certified to ISO/IEC 17025)	134010
ASTM Color 5, (certified to ISO/IEC 17025)	134020
ASTM Color 7, (certified to ISO/IEC 17025)	134030
Gardner Color 2, (certified to ISO/IEC 17025)	134200
Gardner Color 5, (certified to ISO/IEC 17025)	134210
Gardner Color 8, (certified to ISO/IEC 17025)	134220
Pt-Co 5 mg Pt/l, certified under ISO 9001 quality system	134140
Pt-Co 10 mg Pt/l, certified under ISO 9001 quality system	134150
Pt-Co 15 mg Pt/l, certified under ISO 9001 quality system	134160
Pt-Co 30 mg Pt/l, certified under ISO 9001 quality system	134170
Pt-Co 50 mg Pt/l, certified under ISO 9001 quality system	134180
Pt-Co 100 mg Pt/l, certified under ISO 9001 quality system	134190
Pt-Co 500 mg Pt/l (certified to ISO/IEC 17025)	462803
Saybolt Color -10, (certified to ISO/IEC 17025)	134040
Saybolt Color 0, (certified to ISO/IEC 17025)	134050
Saybolt Color +12, (certified to ISO/IEC 17025)	134060
Saybolt Color +25, (certified to ISO/IEC 17025)	134070
Service pack for RCMSi	137380

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