



Excellence in hygienic
refractive index
measurement



**KxS DCM-20 Ingold refractometer
for bioprocessing applications**

Technology that is built on over 40 years of industry-leading experience

KxS process refractometer DCM-20 Ingold is engineered for precise, real-time Brix and concentration measurements in bioprocessing applications.

The DCM-20 consists of a compact, or probe sensor and it comes with Ingold or Sanitary process connections and flow cells for easy installation in process pipes or vessels.

The DCM refractometer provides a full measurement range of 0-100 Brix, utilizing two independent 4-20mA outputs and a digital Ethernet output for connectivity to automatic process control systems.

For enhanced functionality, an optional HMI unit offers a local display and interface, ensuring user-friendly operation.

Applications

- Define liquid product quality in active pharmaceutical ingredients.
- Achieve and ensure dissolved sugar carbon source in fermentation processes.
- Correlate membrane filtration efficiency in protein separation in Ultra Filtration systems
- Optimize steam feed in evaporation and crystallization processes
- And more

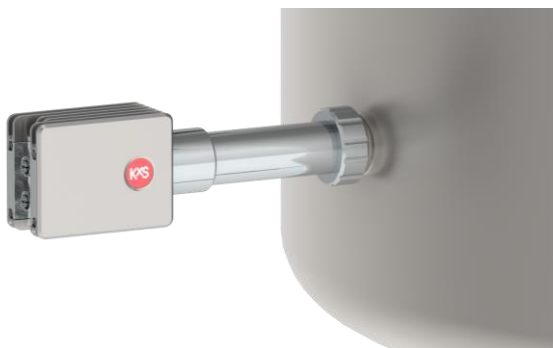


Other typical applications

- Blood plasma ultrafiltration
- Vaccine production
- Pharmaceutical crystallization
- Sucrose density

Installation examples

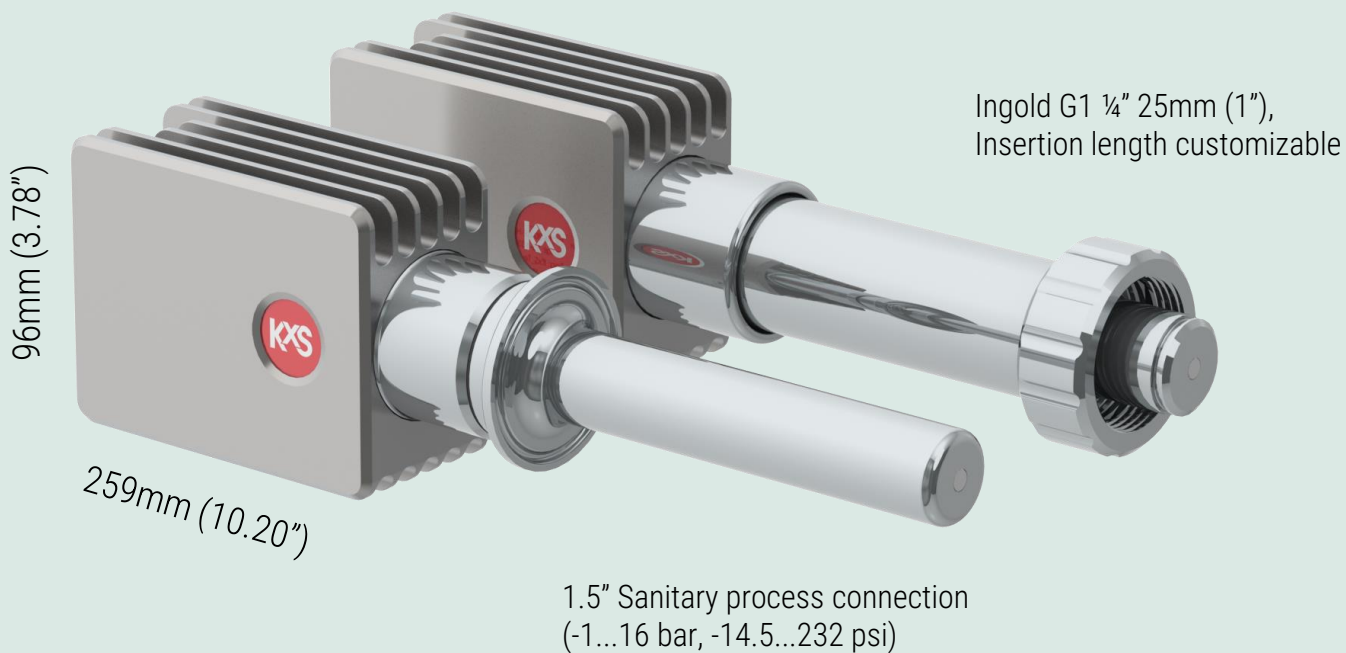
1" Ingold connection in bioreactor and ultra filtration systems



1.5" sanitary clamp connection in bioreactor



0.5" Pharma flow cell with mini-clamp



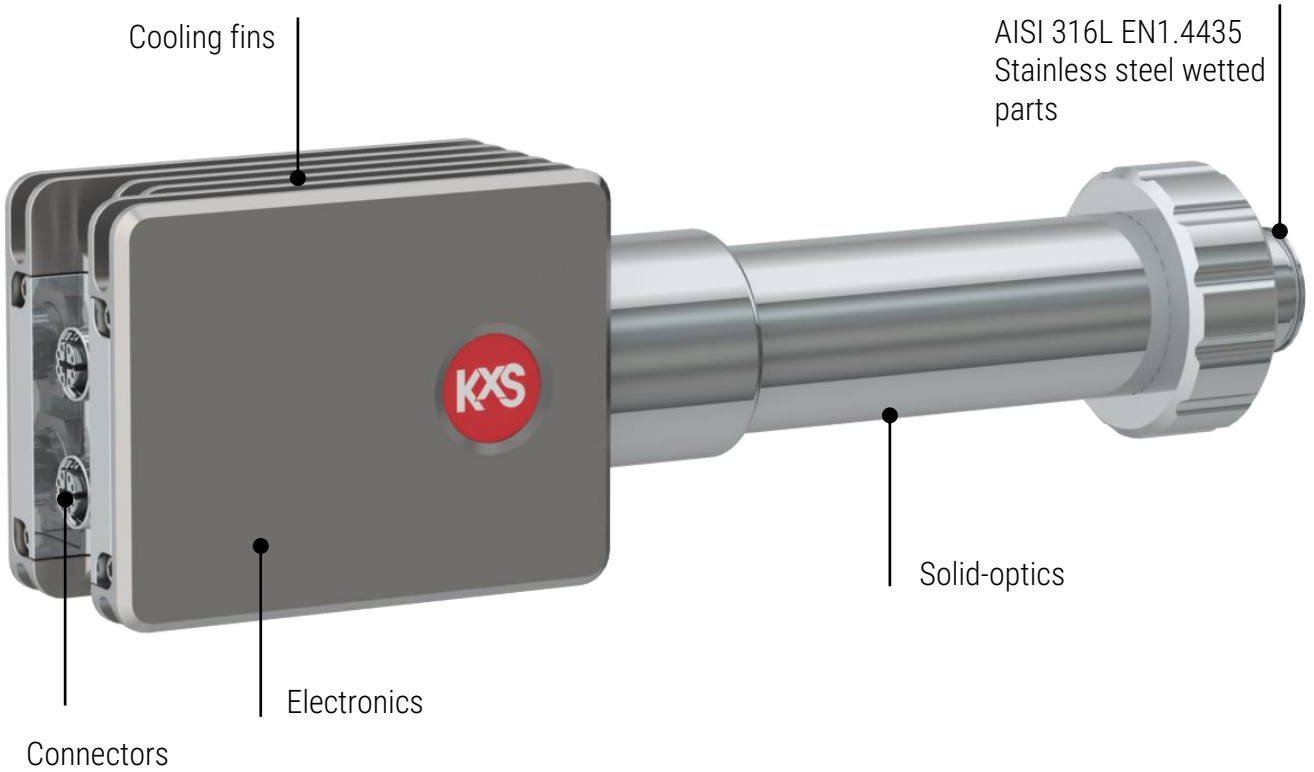
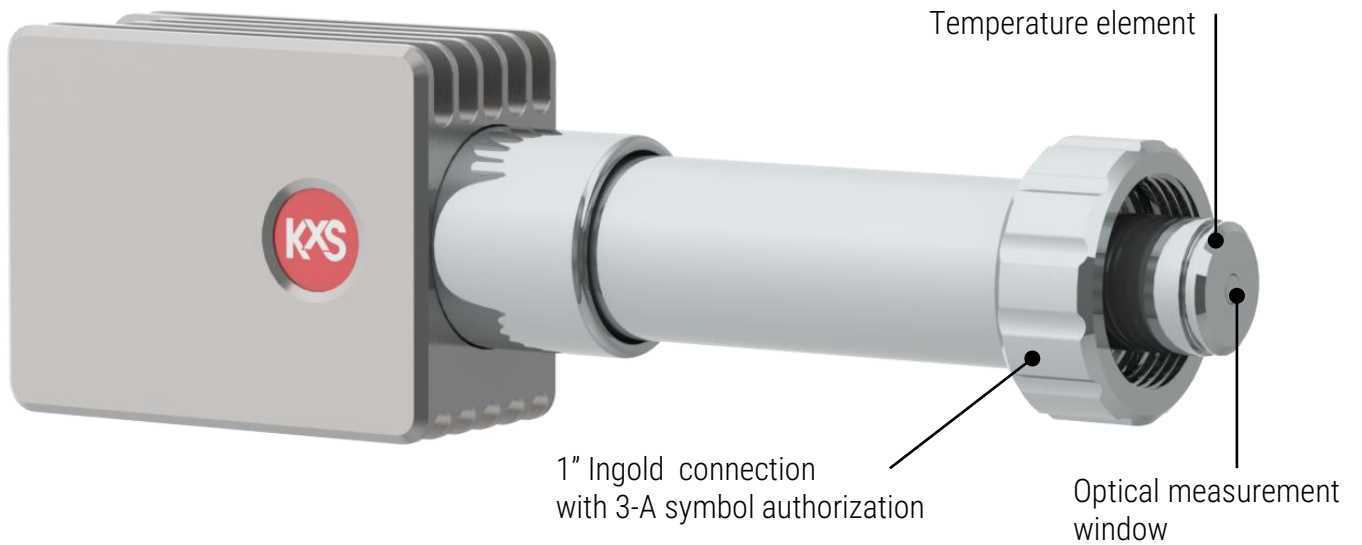
Optimal footprint

- Weight 2.0kg (4.4lbs)
- True stand-alone
- Optional Modular Connection Unit and Web HMI

Thermal management

- Solid optics module provides reliable thermal properties and rigidity
- Isolated electronics for true concentration temperature compensation
- Individual zero-point calibration

Key design features

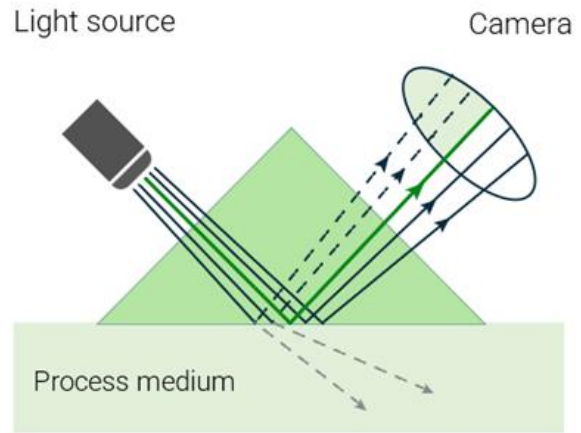


Optical refractive index measurement principle

KxS process refractometers DCM (digital concentration monitoring) employ the physical phenomenon of Refractive Index to define liquid concentration.

Optical concentration measurement is based on Snell's law and the critical angle of total reflection to provide precise readings.

Light is emitted from an LED and directed towards the interface between an optical window and the liquid being measured. As the concentration of the liquid changes, specific angles of the light are totally reflected and partially reflected back, producing light and shadow interface that is captured by a digital camera sensing element.



This interface is detected by the light-activated camera pixels and converted into refractive index (RI).

The RI values can be directly used or further translated into any concentration units, such as percentage by weight. This method ensures that measurement signals are provided instantaneously, allowing for real-time process control.

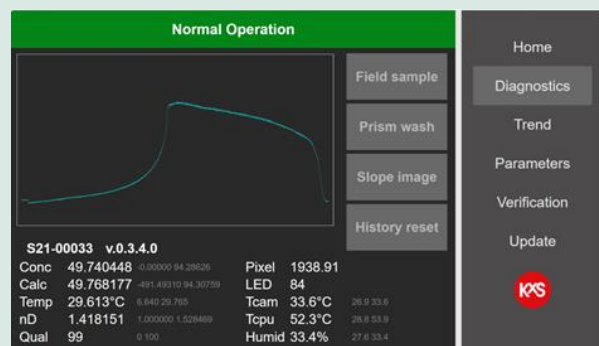
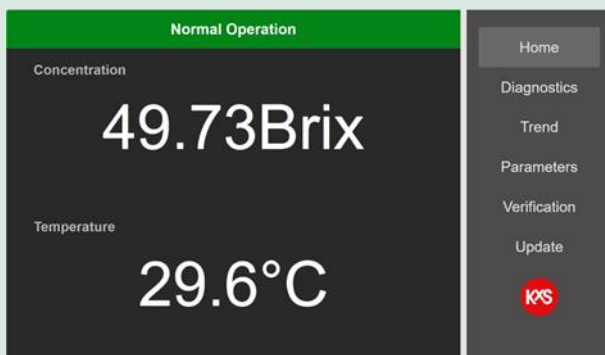
User interface

The DCM-20 measures refractive index and displays temperature-compensated concentration units in Brix, % by weight, total solids or any engineering unit. All measurement functions are integrated in the sensor in a stand-alone setup, no transmitter is required.

However, external displays with different sizes are available for connection through the sensor digital port.

Computer, tablet or mobile phone with a web browser serves as user interface for accessing sensor diagnostics and settings.

Advanced optical image detection with proprietary pattern recognition.



KxS Inline DCM-20 Ingold refractometer specifications

Refractive Index range:	Full range, nD=1.3200...1.5300 (equal by definition to 0...100%wt)
Output units:	Brix / Conc% / g/cm ³ / refractive index unit RIU
Measurement precision:	± 0.025 Brix/%wt
Measurement accuracy:	± 0.0004 refractive index unit RIU
Speed of response:	1 sec. undamped
Optics:	No mechanical adjustments and digital measurement with 4000-pixel camera, 589 nm wavelength (sodium D-line) light emitting diode (LED), built-in Pt-1000 temperature sensor (linearization according to IEC 751)
Temperature compensation:	Automatic, instrument individual zero-point calibration
Calibration:	NIST traceable calibration, verification with standard RIU liquids
Wetted parts:	AISI316L EN 1.4435 Stainless steel, Sapphire optical window, PTFE USP <88> Class VI, FDA 21 CFR 177.1550 (perfluorocarbon resins) EPDM O-ring ADI free, USP <88> Class VI - 121°C, FDA 21CFR177.2600 a-d, e, f Sensor housing: AISI316 Stainless Steel
Surface roughness	Ra 0.38 µm (15 µ inch), electropolished (no animal derived ingredients)
Hygienic design: Process connection:	For the 1.5" sanitary connection 3-A Sanitary Standard 46-04 Ingold G1 ¼" 25mm (1") and 1.5" sanitary TriClamp connections Insertion length customizable
Process pressure:	-1 to 16 bar, -14.5 to -232 psi (according to standard Ingold weld-in sockets)
Process temperature:	-15°C (-40°F)...100°C (212°F) continuous process temperature Withstands 130 °C Clean-in-Place CIP and Steam-in-Place SIP sequences
Ambient temperature: Sensor protection class: Installation: Sensor weight:	-15°C (-40°F)...65°C (149°F) IP67, Nema 4X Indoor unclassified area, or ATEX/IECEx Zone 2 outside and Zone 1 inside tank 1.3 kg, 2.9 lbs
Outputs and connections:	
Digital M12 connector:	24VDC power supply, Modbus TCP for user interface and PLC connection, normal cable length 10 m(33 ft), max 70 m(230 ft)
Analog M12 connector:	24VDC power supply, 2 pcs independent 4-20 mA user configurable outputs, normal cable length 10 m(33 ft), max, 200 m(660 ft). Max. load 1000 Ohm
Sensor Power consumption:	max. 2.5W
Options:	Modular Connection Unit enclosure with optional display/user interface Independent 7" or 15" Web HMI, full color touch screen interface, Direct integration with Rockwell's PLC for Ethernet IP communications ATEX/IECEx approval for Ex ec mc IIC t4 Gb/Gc