

SANITARY PROCESS  
REFRACTOMETER FOR  
IN-LINE BRIX MEASUREMENT

**K-PATENTS**  
PROCESS INSTRUMENTS



SANITARY REFRACTOMETER PR-03-A

# TYPICAL APPLICATIONS

## FOOD

### CONCENTRATES

fruit and vegetable concentrates and purees

### CONFECTIONARY

candies, caramel, chocolate, fudge, flavors, jellies, toffee, syrup, topping, sugar coating on chewing gum

### DAIRY PRODUCTS

condensed milk, skimmed milk, milk powder, caseinate, yeast extract, yoghurt, whey

### DELI FOODS

baby food, gelatine desserts, barbeque sauce, ketchup, tomato paste, tomato pure, salad dressing, jam, marmelade, table syrup

### EGG

egg, egg yolk, egg white

### PRESERVES

canned fruits and vegetables, instant soups, tomato soup, chicken soup

## BEVERAGES

### DRINKS AND JUICES

fruit juices, blended juices, tomato juice, soft drinks, fruit drinks, energy and sports drinks, ice tea, ice coffee, juice concentrate, beverage base

### BEER

beer wort, cut beer

### INSTANT DRINKS

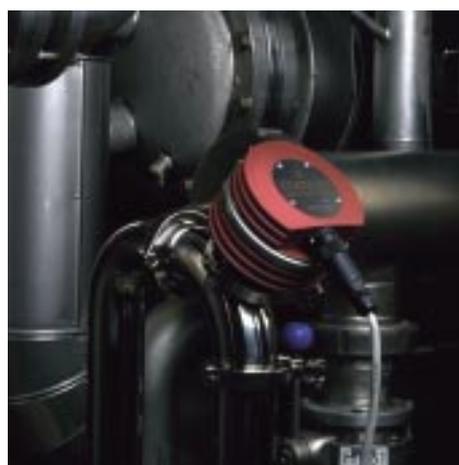
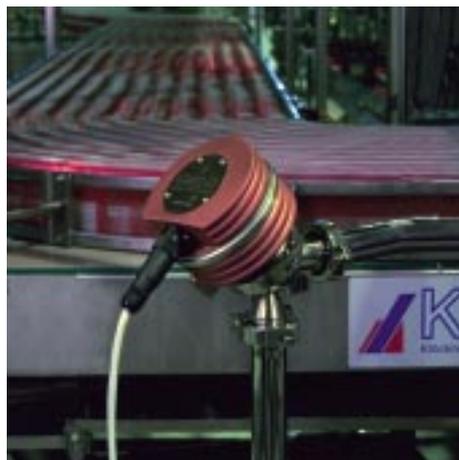
instant coffee, instant tea

### WINES AND LIQUORS

liquors, cider, wine, grape must

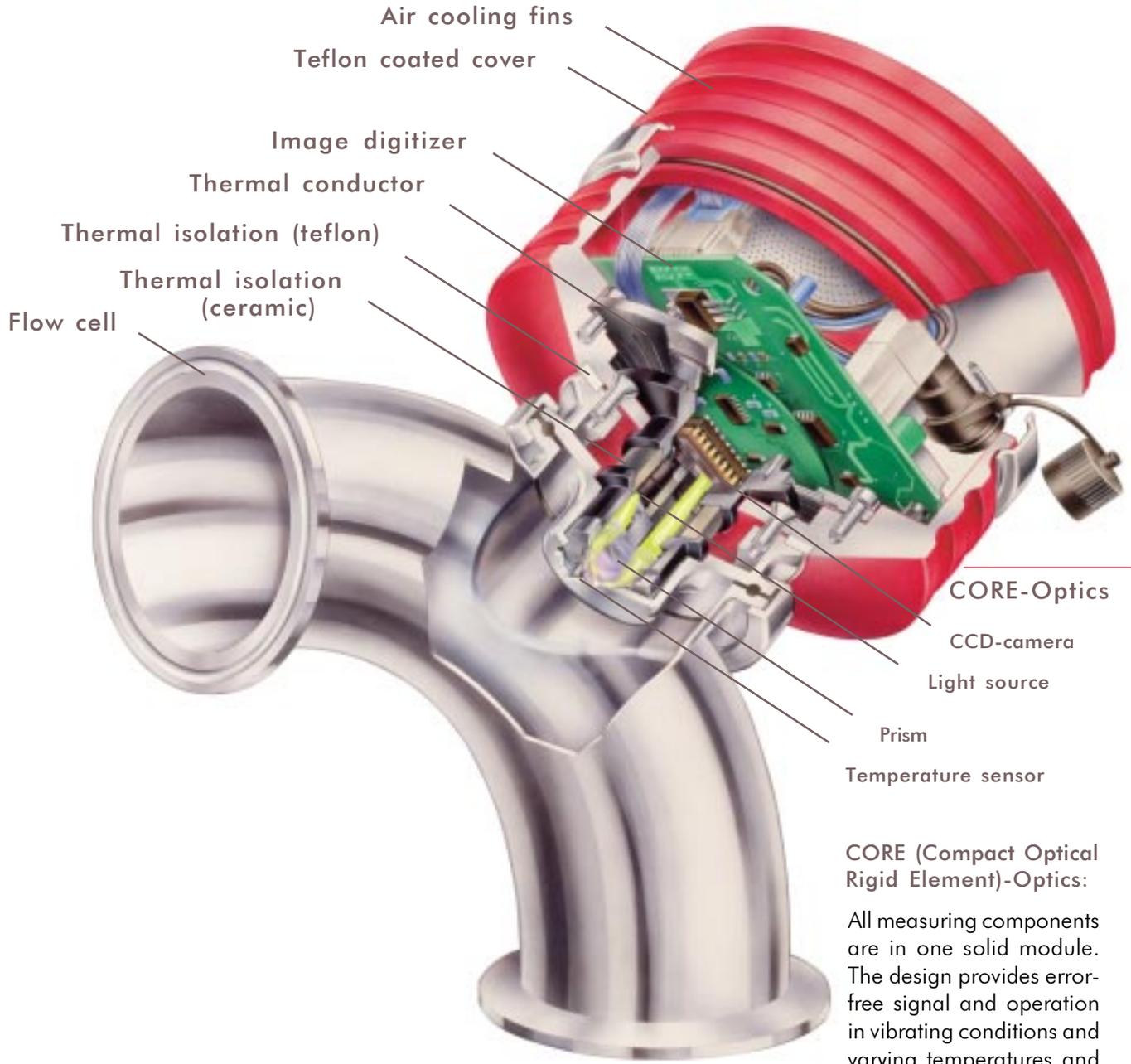
## USE OF SWEETENERS

sucrose, high fructose corn syrup, sorbitol, dextrose, glucose, xylose, maltose, mannitol, lactitol, aspartame, flavors



K-PATENTS SANITARY REFRACTOMETER PR-03-A

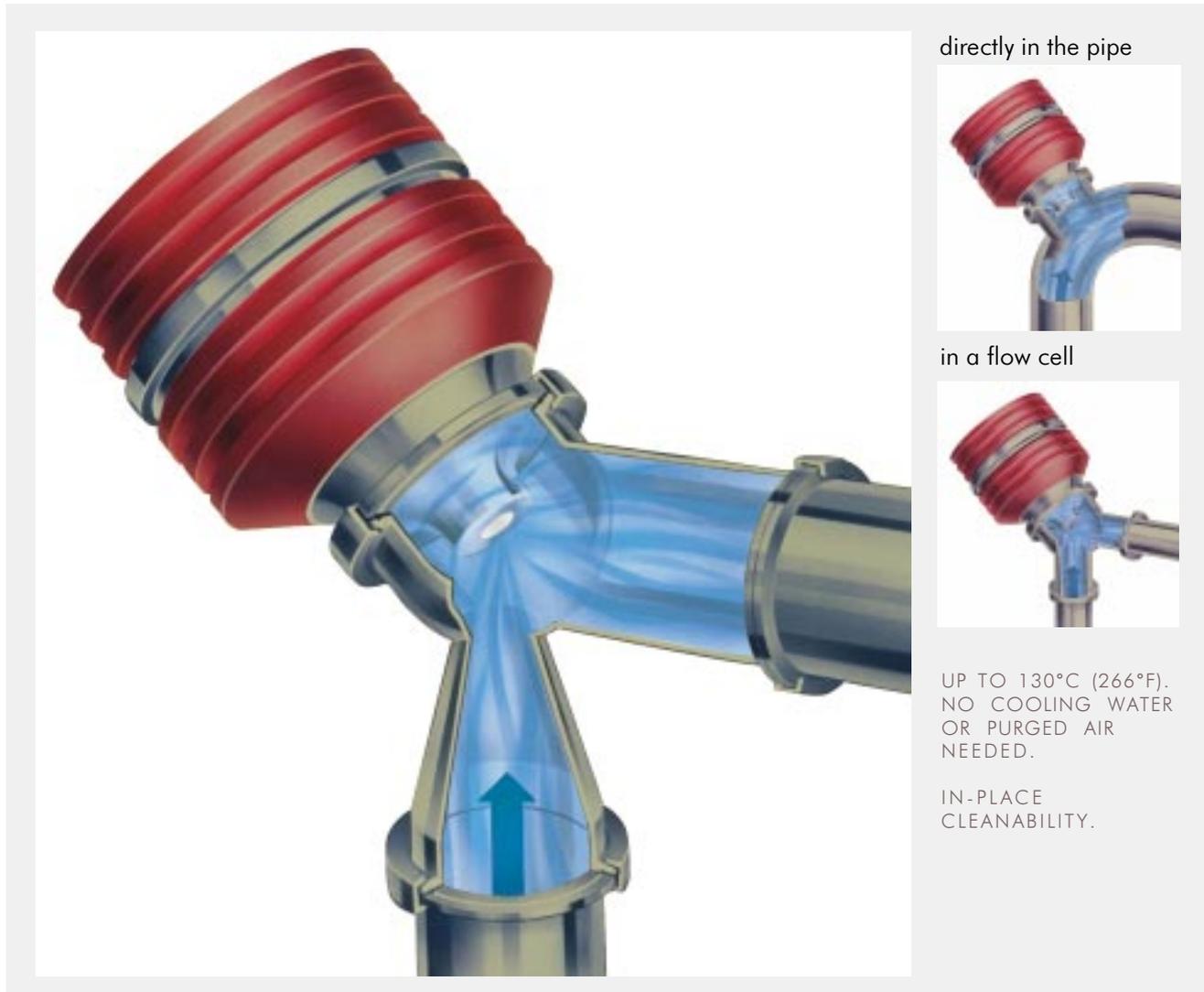
# 3A DESIGN



### CORE (Compact Optical Rigid Element)-Optics:

All measuring components are in one solid module. The design provides error-free signal and operation in vibrating conditions and varying temperatures and pressures.

# EASY TO INSTALL IN ANY PIPE BEND



## OPTIMUM FLOW ON THE PRISM PROVIDES SELF-CLEANING

K-Patents Sanitary Refractometer PR-03-A is easy to install in any pipe bend . The mounting site is freely selectable, because the PR-03-A has a separate sensor and indicating transmitter.

The sensor is angle mounted in a pipe bend directly or through a specially designed sanitary flow cell. The mounting design provides optimum flow velocity on the measurement surface keeping it clean.

Round and smooth edges in the sensor and the flow cell ensure absolute self-drainage.

# MEASUREMENT PRINCIPLE

K-Patents PR-03-A determines the refractive index by measuring the critical angle of refraction.



A light source transmits light against the interface between a prism and the process solution. The light rays meet the surface at different angles.

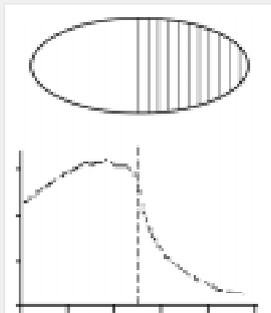
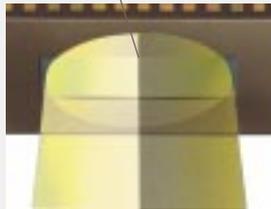
Part of the light is totally reflected and part of the light is partially reflected and partially refracted into the process solution.

The reflected rays form an image with a dark area and a light area. The position of the shadow line shows the value of the critical angle and thus the refractive index.

A digital CCD-camera detects the optical image and the shadow line.

The optical image is converted to an electric signal.

The quality of the optical image is mathematically analysed and constantly monitored to ensure reliable measurement and high precision.



PATENTED OPTICAL IMAGE DETECTION

# CALIBRATION

K-Patents PR-03-A is precalibrated to 0-100 Brix using certified refractive index liquids and the ICUMSA table.

The measurement range and measurement unit are freely changeable by keyboard entry. No mechanical adjustments or parts are needed. The change can be done also, when the instrument is installed and operating.

## EASY FINETUNING BY FIELD CALIBRATION

The final calibration can be finetuned according to the users standard laboratory determinations.

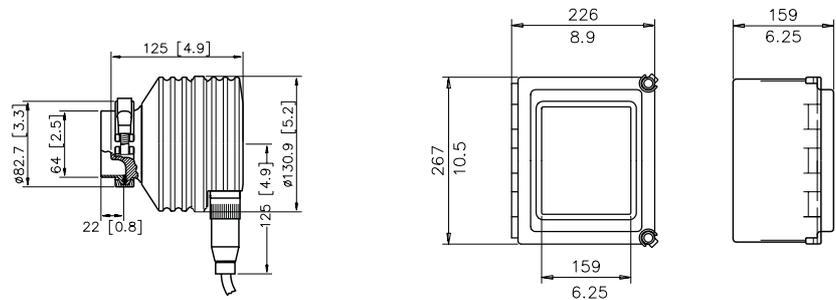
The user collects samples under different process conditions and takes simultaneous display readings. A computer program calculates new parameters and they are entered through the keyboard.

## VERIFICATION USING CERTIFIED REFRACTIVE INDEX LIQUIDS

K-Patents PR-03-A calibration and accuracy can be verified and traced to national standards. This is needed for ISO 9000 or other quality systems.

0-100 Brix

# SPECIFICATIONS



Refractive Index range:	R.I. 1.3100...1.5400 (corresponds to hot water... 100 Brix)
Accuracy:	R.I. $\pm 0.0002$ (corresponds typically to $\pm 0.1\%$ by weight).
	Repeatability and stability correspond to accuracy.
Speed of response:	1.2 s undamped
Damping time constant:	Selectable up to 5 min
Process temperature:	-20°C...130°C (-4°F...266°F)
Temperature compensation:	Automatic, by mathematical curve
Ambient temperature:	Sensor: max. 45°C (113°F), min. -20°C (-4°F),
Indicating transmitter:	max. 50°C (122°F), min. 0°C (32°F)
Process pressure:	Sanitary clamp max. 15 bar (200 psi) at 20 °C (70 °F)/9 bar (125 psi) at 120 °C (250 °F)
Recommended flow velocity:	Above 1.5 m/s (5 ft/s)
Quality certificate:	ISO 9001
<b>SENSOR:</b>	<b>Meets the requirements of the 3-A Sanitary Standard</b>
Wetted parts:	AISI 316L stainless steel, prism gaskets teflon, prism spinel
Sensor weight:	2 kg (4.4 lbs)
Sensor protection class:	IP67, Nema 4X
Process connection:	2 1/2" Sanitary clamp, gasket EPDM
Temperature measurement:	Built-in Pt-100
Image detector:	1024 pixel CCD-element
Light source:	Light emitting diode (LED)
In-place cleanability:	Meets the requirements of EHEDG (European Hygienic Design Group) test procedure
<b>INDICATING TRANSMITTER:</b>	<b>Enclosure IP66, Nema 4X</b>
Indicating Transmitter weight:	4,5 kg (10 lbs)
Display:	256 x 128 pixels graphic liquid crystal (LCD)
Keypad:	18 membrane keys
Current output:	4-20 mA/0-20 mA, max. load 1000 Ohm, Galvanic isolation 1500 V DC or AC (peak)
Serial output:	RS485/RS232, Galvanic isolation 500 V DC or AC (peak)
Power:	100-115 V/220-240 V, 50/60 Hz, 15 VA
Alarms:	Two built-in signal relays, max 24 V, 500 mA, DC/AC
<b>INTERCONNECTING CABLE:</b>	<b>Shielded cable, 2 twisted pairs with individual shields, 0.5 mm<sup>2</sup>.</b>
	Digital transmission according to RS485.
Interconnecting cable length:	Standard 10 m (33 ft), max. 100 m (330 ft)
<b>OPTIONS:</b>	
	Cable fittings to the Indicating Transmitter: European cable glands or US conduit hubs
	External output unit 4-20 mA
	Relay units for prism wash/alarm
	Prism wash nozzles for steam and hot water
	Flow cells

## ORDERING INFORMATION:

- Desired scale, properties of process solution
- Process temperature and pressure range
- Process flow range and pipe diameter
- Desired process and sensor connection/flow cell
- Length of interconnecting cables
- Supply voltage and frequency
- Options and accessories

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We reserve right to technical alterations.