All measuring components are in one solid CORE-optics module. The patented CORE-optics is mechanically isolated from the influence of external forces and vibrations. The CORE-optics contains no mechanical adjustments. (US Patent No. 6067151)

**SPECIFICATIONS**

- **Design**
  - CORE-Optics
  - Temperature sensor
  - Thermal isolation
  - Processor card
  - Light source
  - Prism
  - CCD-camera

- **Description of the range**
  - A.U. range: 0 to 100 Brix. Corresponds to the water: 0 to 100 D.D.
  - A.U. range: 0 to 100 %.

- **Performance**
  - Resolution: 0.001 Brix
  - Accuracy: 0.01% of reading ±0.0002 Brix

- **Accuracy and repeatability**
  - Repeatability and stability correspond to accuracy

- **Speed of response**
  - 1 s undamped, damping time selectable up to 5 min

- **Calibration**
  - With Carrille standard RI liquids over full range of nD 1.3100...1.5400

- **CORE-Optics**
  - No mechanical adjustments (US Patent No. 6067151)

- **Digital measurement**
  - 3648 pixel CCD element

- **Light source**
  - Light emitting diode (LED), 589 nm wavelength, sodium light

- **Temperature sensor**
  - Built-in Pt-1000, linearization according to IEC 751

- **Temperature compensation**
  - Automatic, digital compensation

- **Instrument verification**
  - With standard RI liquids and K-Patents documented procedure

- **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)

- **SENSOR PR-23-A**
  - Compact sensor model for small pipe lines
  - Sanitary 3A-clamp 2.5"; Varivent in-line access unit clamp DN65 or via elbow flowcell (for line sizes of 2.5" and smaller)

- **PR-23-AP**
  - Probe sensor model for large pipe lines and vessels
  - Sanitary 3A-clamp 2.5"; Sanitary 3A-clamp 4" or MT4 DN 25/1T APV Tank bottom flange

- **Sanitary design**
  - 3-A Sanitary Standard 46-02 approved and EHEDG (European Hygienic Equipment Design Group) tested

- **Process pressure**
  - Sanitary clamp max. 15 bar (200 psi) at 20°C (70°F)/9 bar (125 psi) at 120°C (250°F)

- **Process temperature**
  - PR-23-AC: - 20°C...130°C (-4°F ...266°F), PR-23-AP: -20°C...150°C (-4°F ...302°F)

- **Process wetted parts, standard**
  - AISI 316L stainless steel, prism spinel, prism gaskets PTFE (teflon)

- **Sensor protection class**
  - IP67, Nema 4X

- **Sensor weight**
  - PR-23-AC: 2.0 kg (4.4 lbs), PR-23-AP: 3.0 kg (6.6 lbs)

- **Display**
  - 320x240 pixel graphical LCD with LED backlight

- **Keypad**
  - 18 membrane keys

- **Current output**
  - Two independent current sources, 4-20 mA, max. load 1000 Ohm, galvanic isolation 1500 VDC or AC (peak), hold function during prism wash

- **Power**
  - AC input 100-240 VAC/50-60 Hz, optional 24 VDC

- **Alarms/Wash relays**
  - Two built-in signal relays, max. 250 V/3 A

- **Sensor connectivity**
  - One or two sensors can be connected to the DTR. Sensors independent of each other: own parameter sets and usable in different applications.

- **Transmitter protection class**
  - Enclosure IP66, Nema 4X

- **Indicating Transmitter weight**
  - 4.5 kg (10 lbs)

- **INTERCONNECTING CABLE**
  - IEC 61158-2 compliant two-wire cable

- **Interconnecting cable length**
  - Standard 10 m (33 ft), max. 200 m (660 ft)

- **OPTIONS**
  - Stainless steel sensor housing, prism wash, cable fittings to the indicating transmitter: European cable glands M20x1.5 or US conduit hubs

- **ORDERING INFORMATION**
  - Sensor type and process connection
  - Desired scale
  - Properties of process solution
  - Process temperature range
  - Process pressure range
  - Length of interconnecting cable
  - Supply voltage and frequency
  - Options and accessories

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The company reserves the right to technical alterations.

**K-PATENTS SANITARY PROCESS REFRACTOMETER PR-23-A**

**SPECS PR-23-A**

- **Display**
  - 320x240 pixel graphical LCD with LED backlight

- **Keypad**
  - 18 membrane keys

- **Current output**
  - Two independent current sources, 4-20 mA, max. load 1000 Ohm, galvanic isolation 1500 VDC or AC (peak), hold function during prism wash

- **Power**
  - AC input 100-240 VAC/50-60 Hz, optional 24 VDC

- **Alarms/Wash relays**
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  - One or two sensors can be connected to the DTR. Sensors independent of each other: own parameter sets and usable in different applications.

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- **ORDERING INFORMATION**
  - Sensor type and process connection
  - Desired scale
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TYPICAL APPLICATIONS

FOOD
Cereals, vegetables, beans, sugar, dextrose, fruits, lactose,
syrups, starch, rice, flour, alcohol, vinegar, sauerkraut, vegetable
soups, terrine, marc, jams, jellies, marmalades, preserves,
adhesive glues, colorful laser inks, inkjet inks, textile
printing, coffee, tea, cocoa, chocolate, candies, bakery
products, dietary fiber, sports nutrition.

BEVERAGE
Beverage products, carbonated drinks, coffee, wine,
tea, ice tea, soft drinks, sport drinks, all types of
alcoholic drinks.

FRUITS AND BERRIES PREPARATION
Juices, jams, marmalades, fruit puree, fruit gelatin,
sugar (liquid and crystallized), fruit spreads, apple jam,
cranberries, gooseberries, cherries, raspberries,
plums, apricots, prunes, apricots, peaches, nectarines,
pears, pineapple, dried fruit, white wine, red wine,
beer, wine distillates, grape must.

STARCH SWEETENERS
Cereal products, corn starch, dextrins, glucose,
fructose, rice flour, sugar beet flour, laevulose,
honey, maltose, malt syrup, corn sweeteners,
corn syrup, cornstarch, dextrose, maltose, invert
starch, corn syrup, high fructose corn syrup,
sucrose, sorbitol, dextrose, glucose,
fructose, honey, crystalline cellulose,
carmelized sugar, crystals, fructose,
granulated sugar, dextrose, fructose.

SUGAR MOLASSES
Used as drying agent of beet and cane sugar molasses,
desugarisation by chromatographic separation.

TYPICAL APPLICATIONS

K-Patents Sanitary Process Refractometer
PR-23-A is beyond doubt the indicator means
of measuring liquid concentrations and a key to
various process applications. With
K-Patents PR-23-A the product quality can be
controlled precisely over the whole
batch without costly sampling.

This measurement accuracy is not
influenced by particles, bubbles, sugar
crystals, seeds, fibers, color, or temperature
changes in the process medium.

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

The K-Patents PR-23-A does not require
any recalibration or frequent
maintenance.

INSTALLATION

COMPACT SENSOR FOR SMALL PIPES

Pipe bend

To keep velocity
above 1.5 m/s

Small pipe

Cooker with scraper and
screened outlet

PROBE SENSOR FOR LARGE PIPES AND VESSELS

Pipe bend

Large pipe

Vessel

CALIBRATION

K-Patents Sanitary Process Refractometer
PR-23-A sensor is factory calibrated to
a measure refractive index, and temperature.
Each sensor has identical calibration
nD=1.31...1.54 (corresponding to 0-100 Brix).

The non-linear conversion from refractive
index to Brix or concentration units and
also temperature compensation are based
on standard tables. They are programmed
inside the transmitter independently of the
connected sensor. Therefore, all sensors are
freely interchangeable.

K-Patents manufacturing process is
ISO 9001 certified. K-Patents also
supplies the verification within the user's
own quality system.

K-Patents’ manufacturing process is
also temperature compensation are based
on standard tables. They are programmed
interchangeable. Therefore, all sensors are
freely interchangeable.

sensor. Therefore, all sensors are freely
interchangeable.

The exact shadow line position is
point-by-point to an electrical signal.

A digital CCD-camera detects the
optical image and the shadow line. The
camera transforms the optical image
point-by-point to an electrical signal.

The exact shadow line position is
translated and the refractive index is
determined.

An industrial temperature sensor
measures the temperature T on the
surface of the process liquid.

The diagnostics program ensures that
the measurement is reliable.
**Typical Applications**

**Food**
- Confectionery, candy, conreed, lodges, marmalade, chocolate, sugar coating, coffee, jams, jellies, instant soups, sauces, dried vegetables, peas, beans, oils, spices, vinegar, sauces, dressings, salt, sugar, water, glucose, sucrose, corn syrup.
- Cereal products, bakery products, landscaping.

**Beverage**
- Alcohol, soft drinks, juices, milk, milk products, fruit juices, canned vegetables, sauces, instant soups, soy, soybean, whey, egg, egg yolk, egg white.
- Preserves, canned fruits, jams, jellies, marmalades, preserves, ice tea, ice coffee, instant coffee, instant tea. Soft drinks, juices, blended fruit juices and nectars, juice concentrate, alcohol, rum, molasses, liquors, cider, beer, wort, cut beer.

**Fruits and Berries Preparation**
- Apples, pears, pineapples, cranberries, gooseberries, cherries and more.

**Starch Sweeteners**
- Isomalt, maltose, dextrose syrups, cooling crystallizer, precrystallizer, main crystallizer, xylose, maltose, mannitol, lactitol, aspartame, flavors.

**Sugar Molasses**
- Cane sugar (liquid and crystal sugar), apples, pears, pineapples, jams, jellies, marmalades, preserves and all types of syrups and topings.

**Dilution and Blending of Beet and Cane Sugar Molasses**
- Small pipe, vessel, pipe bend, steam jacket, scraper and vapor dome.

**Installation**
- Compact sensor for small pipes.
- Probe sensor for large pipes and vessels.

**Calibration**

K-Patents Sanitary Process Refractometer PR-23-A sensor is factory calibrated to measure refractive index, and temperature T in standard units. Each sensor has identical calibration nD=1.31...1.54 (corresponding to 0-100 Brix).

The non-linear conversion from refractive index to Brix or concentration units and also temperature compensation are based on standard tables. The calibration inside the transmitter independence of the sensor. Therefore, all sensors are freely interchangeable.

K-Patents manufacturing process is ISO 9001 certified. K-Patents also supports the verification within the user's own quality system.

K-Patents PR-23-A is also temperature compensated and also temperature changes in the process monitored. The measurement accuracy is not influenced by particle, bubbles, sugar crystals, seeds, fibers, colour or temperature changes in the process medium.

The measurement range and the measurement unit can be freely changed by keyboard entry. No mechanical adjustments or parts are needed. The change can be done, when the instrument is installed and operating. The K-Patents PR-23-A does not require any recalibration or frequent maintenance.

**Digital Measurement Principle**

The light source sends light against the surface where the rays meet the surface of the process liquid. The light is reflected into the process solution.

Depending on the angle, some rays are totally reflected. And, some rays are only partially reflected, most of the light is refracted into the process solution. And, some rays are only totally reflected. And, some rays are only partially reflected, most of the light is reflected into the process solution.

Thus an optical image with a dark sector and a light sector is created.

**Operation**

K-Patents Sanitary Process Refractometer PR-23-A provides truly accurate means for measuring liquid concentrations and also temperature process applications. With K-Patents PR-23-A the product quality can be controlled precisely over the whole batch without costly sampling.

The measurement accuracy is not influenced by particle, bubbles, sugar crystals, seeds, fibers, colour or temperature changes in the process medium.

K-Patents PR-23-A is also temperature compensated and also temperature changes in the process monitored. The measurement accuracy is not influenced by particle, bubbles, sugar crystals, seeds, fibers, colour or temperature changes in the process medium.

The measurement range and the measurement unit can be freely changed by keyboard entry. No mechanical adjustments or parts are needed. The change can be done, when the instrument is installed and operating. The K-Patents PR-23-A does not require any recalibration or frequent maintenance.

K-Patents Sanitary Process Refractometer PR-23-A provides truly accurate means for measuring liquid concentrations and also temperature process applications. With K-Patents PR-23-A the product quality can be controlled precisely over the whole batch without costly sampling.
**TYPICAL APPLICATIONS**

**FOOD**
- Confectionaries, candies, caramel, glucose, fructose, high fructose corn syrup, concentrated fruit and vegetable juices, jams, ketchup, tomato paste, sausages, dairy products, frozen pizza, landscape.

**BEVERAGE**
- Alcohol, cocoa, milk, beans, soy, rice, lemon, mint, cut Beauties, flavored fruit purees and nectars, prune concentrates, tea, coffee, instant coffee, instant tea, black coffee, green and red teas, lavender tea, thyme, papaya qual.

**FRUITS AND BERRIES PREPARATION**
- Apples, pears, pineapples, plums, strawberries, blueberries, raspberries, sugar (liquid and crystal sugar), cranberries, gooseberries, cherries and more.

**STARCH SWEETENERS**
- Dextrose, dextrose syrups, cooling crystallizer, precrystallizer, main crystallizer, xylose, maltose, mannitol, lactitol, aspartame, flavors.

**SUGAR MOULASSES**
- Sucrose, high fructose corn syrup, sorbitol, dextrose, glucose, starch sweeteners, alcohol, rum, molasses, liquors, cider, beer, wort, cut beer.

**JAMS, JELLIES, MARMALADES, PRESERVES**
- Energy and sport drinks, beverage base, wines, grape must, ice tea, ice coffee, instant coffee, instant tea, soft drinks, juices, blended fruit juices and nectars, juice concentrate, alcohol, syrup, topping, sugar coating.

**CONDIMENT**
- Milk, tomato based products, tomato puree, ketchup, fruits, canned vegetables, sauces, instant soups, soy, soy yoghurt, whey, egg, egg yolk, egg white, preserves, canned milk, skimmed milk, milk powder, caseinate, yeast extract, syrup, topping, sugar coating.

**CONFECTIONARY**
- Dairy products, condensed milk, confectionary, candies, caramel, fudge, toffee, flavors.

**OPERATION**
- Process crystallizer.
- Dextrose syrups, cooling crystallizer, precrystallizer, main crystallizer, xylose, maltose, mannitol, lactitol, aspartame, flavors.
- Succrose, high fructose corn syrup, sorbitol, dextrose, glucose, starch sweeteners, alcohol, rum, molasses, liquors, cider, beer, wort, cut beer.

**PRODUCT QUALITY**
- Energy and sport drinks, beverage base, wines, grape must, ice tea, ice coffee, instant coffee, instant tea, soft drinks, juices, blended fruit juices and nectars, juice concentrate, alcohol, syrup, topping, sugar coating.

**MEASUREMENTS**
- Jams, jellies, marmalades, preserves and all types of food products, dairy products, frozen pizza, landscape.

**DIGITAL MEASUREMENT**
- Process crystallizer.
- Dextrose syrups, cooling crystallizer, precrystallizer, main crystallizer, xylose, maltose, mannitol, lactitol, aspartame, flavors.
- Sucrose, high fructose corn syrup, sorbitol, dextrose, glucose, starch sweeteners, alcohol, rum, molasses, liquors, cider, beer, wort, cut beer.

**PHYSICAL PROPERTIES**
- Energy and sport drinks, beverage base, wines, grape must, ice tea, ice coffee, instant coffee, instant tea, soft drinks, juices, blended fruit juices and nectars, juice concentrate, alcohol, syrup, topping, sugar coating.

**INTEGRATION**
- Process crystallizer.
- Dextrose syrups, cooling crystallizer, precrystallizer, main crystallizer, xylose, maltose, mannitol, lactitol, aspartame, flavors.
- Sucrose, high fructose corn syrup, sorbitol, dextrose, glucose, starch sweeteners, alcohol, rum, molasses, liquors, cider, beer, wort, cut beer.

**APPLICATIONS**
- Energy and sport drinks, beverage base, wines, grape must, ice tea, ice coffee, instant coffee, instant tea, soft drinks, juices, blended fruit juices and nectars, juice concentrate, alcohol, syrup, topping, sugar coating.

**PROCESSES**
- Process crystallizer.
- Dextrose syrups, cooling crystallizer, precrystallizer, main crystallizer, xylose, maltose, mannitol, lactitol, aspartame, flavors.
- Sucrose, high fructose corn syrup, sorbitol, dextrose, glucose, starch sweeteners, alcohol, rum, molasses, liquors, cider, beer, wort, cut beer.
An international team of scientists and engineers has developed a new SANITARY PROCESS REFRACTOMETER for BRIX AND CONCENTRATION MEASUREMENT. The instrument is designed for demanding industrial environments and is made in Finland. 

**SPECIFICATIONS**

**DESIGN**

All measuring components are in one solid CORE-optics module. The patented CORE-optics is mechanically isolated from the influence of external forces and vibrations. The CORE-optics contains no mechanical adjustments (US Patent No. 6067151).

**COMPONENTS**

- **Air cooling fins**
- **Processor card**
- **Thermal conductor**
- **Thermal isolation**
- **Light source**
- **Temperature sensor**
- **Prism**
- **CORE-Optics**
- **CCD-camera**

**K-PATENTS SANITARY PROCESS REFRACTOMETER PR-23-A**

SB:PR-23-A/0

**SPECIFICATIONS**

**INTERFACE TO THE MEASURED SIGNAL**

- **All ranges, a = 1, R = 1, G = 0.999, correspondence to the water: 15°C**

**TRANSMITTER**

- **Light source**: LED, 589 nm wavelength, sodium light
- **Temperature sensor**: Built-in Pt-1000, linearization according to IEC 751
- **Temperature compensation**: Automatic, digital compensation
- **Calibration**: With Carrille standard RI liquids over full range of nD 1.3100...1.5400
- **Prism**: No mechanical adjustments (US Patent No. US6067151)
- **Light emitting diode (LED)**
- **Wavelength**: 589 nm
- **Standard**: IEC 61158-2
- **Interconnecting cable**: IEC 1021-2 (two-wire cable)
- **Length**: Standard 10 m (33 ft), max. 200 m (660 ft)
- **Protection class**: Enclosure IP66, Nema 4X
- **Weight of transmitter**: 4.5 kg (10 lbs)
- **Current output**: Two independent current sources, 4-20 mA, max. load 1000 Ohm, galvanic isolation 1500 VDC or AC (peak), hold function during prism wash
- **Power**: AC input 100-240 VAC/50-60 Hz, optional 24 VDC
- **Alarms/Wash relays**: Two built-in signal relays, max. 250 V/3 A
- **Sensor connectivity**: One or two sensors can be connected to the DTR. Sensors independent of each other: own parameter sets and usable in different applications. Two current outputs configurable independently to indicate process concentration or temperature of either sensor.

**ORDERING INFORMATION**

- Sensor type and process connection
- Desired scale
- Properties of process solution
- Process temperature range
- Process pressure range
- Length of interconnecting cable
- Supply voltage and frequency
- Options and accessories

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We reserve right to technical alterations.

**K-PATENTS SANITARY PROCESS REFRACTOMETER PR-23-A**
SPECIFICATIONS

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All measuring components are in one solid CORE-optics module. The patented CORE-optics is mechanically isolated from the influence of external forces and vibrations. The CORE-optics contains no mechanical adjustments.

[US Patent No. 6067151]

A SANITARY PROCESS
REFRACTOMETER FOR
BRIX AND CONCENTRATION
MEASUREMENT

DESIGN

The CORE-optics contains no mechanical adjustments (US Patent No. US6067151)

Indicating transmitter DTR

Display: 320x240 pixel graphical LCD with LED backlight

Keypad: 18 membrane keys

Current output: Two independent current sources, 4-20 mA, max. load 1000 Ohm, galvanic isolation 1500 VDC or AC (peak), hold function during prism wash

Power: AC input 100-240 V/AC 50-60Hz or 24 VDC

Alarms/Wash relays: Two built-in signal relays, max. 250 V/3 A

Sensor connectivity: One or two sensors can be connected to the DTR. Sensors independent of each other: own parameter sets and usable in different applications. Two current outputs configurable independently to indicate process concentration or temperature of either sensor.

Transmitter protection class: Enclosure IP66, Nema 4X

Indicating Transmitter weight: 4.5 kg (10 lbs)

INTERCONNECTING CABLE: IEC 61158-2 compliant two-wire cable

Interconnecting cable length: Standard 10 m (33 ft), max. 200 m (660 ft)

OPTIONS: Stainless steel sensor housing, prism wash, cable fittings to the indicating transmitter: European cable glands M20x1.5 or US conduit hubs

ORDERING INFORMATION:
- Sensor type and process connection
- Desired scale
- Properties of process solution
- Process temperature range
- Process pressure range
- Length of interconnecting cable
- Supply voltage and frequency
- Options and accessories

Probe sensor PR-23-AP-T/R for large pipe lines and vessels

Compact sensor PR-23-AC for small pipe lines

Probe sensor PR-23-AP-P for flush mounting on the vessel wall


PR-23-AP: Probe sensor model for large pipe lines and vessels

Process connection: PR-23-AC: Sanitary 3A-clamp 2.5"; Varivent

APV Tank bottom flange

Sanitary design: 3-A Sanitary Standard 46-02 approved and EHEDG (European Hygienic Equipment Design Group) tested

Process pressure: Sanitary clamp max. 15 bar (200 psi) at 20°C (70°F)/9 bar (125 psi) at 120°C (250°F)

Process temperature: PR-23-AC: - 20°C...130°C (-4°F ...266°F), PR-23-AP: -20°C...150°C (-4°F ...302°F)

Process wetted parts, standard: AISI 316L stainless steel, prism spinel, prism gaskets PTFE (teflon)

Sensor protection class: IP67, Nema 4X

Sensor weight: PR-23-AC: 2.0 kg (4.4 lbs), PR-23-AP: 3.0 kg (6.6 lbs)

A refractive index range: Full range, nD = 1.3100...1.5400 (corresponds to hot water...100 Brix)

Accuracy: Refractive index nD ±0.0002 (corresponds typically to ± 0.1% by weight)

Repeatability and stability correspond to accuracy

Speed of response: 1 s undamped, damping time selectable up to 5 min

Calibration: With Caragee standard R.I. liquids over full range of nD 1.3100...1.5400

CORE-Optics: No mechanical adjustments (US Patent No. US6067151)

Digital measurement: 3648 pixel CCD element

Light source: Light emitting diode (LED), 589 nm wavelength, sodium light

Temperature sensor: Built-in Pt-1000, linearization according to IEC 751

Temperature compensation: Automatic, digital compensation

Instrument verification: With standard R.I. liquids and K-Patents documented procedure

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)

We reserve right to technical alterations.