SensoTech

LiquiDens®

Process density meter for liquids

Product description

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Measuring principle

LiquiDens® is a continuous process density meter for density measurement and determination of liquid concentrations.

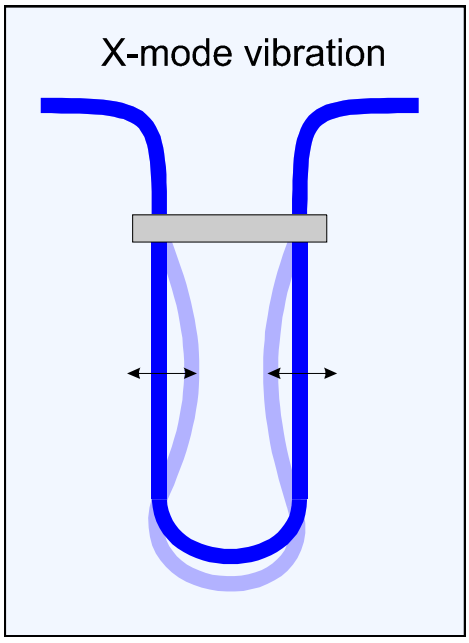
Density will be determined on the basis of the well known „vibrating tube“ principle. The frequency of a vibrating tube in the **X-mode** filled with liquid will be determined. The weight in the tube changes according to the change of liquid density and, consequently, the vibration frequency changes as well.

The **X-mode**® vibration ensures a high accuracy of the density measurement.

LiquiDens consists of one or more density probes and a controller.

The density probe includes the X-tube for density measurement and the temperature measuring gauge.

The controller calculates the standard density (density at 20°C) and the concentration and displays the measured values. The LCD graphic display and the membrane keyboard permit easy system configuration and adaptation to a great variety of measuring jobs.



Range of application

- Density measurement
- Concentration determination
- Mass correction of flow meters
- Process monitoring
- Tracing of reaction course
- Three-component determination with additional sound velocity measurement

Characteristics

- Density measurement with ± 0.1 kg/m^3 accuracy (10^{-4})
- Use in bypass line with 10 mm nominal size
- Up to 32 different products may be selected for normal density or concentration calculation
- Automatic *self-monitoring*
- The measured variable is indicated in clear text on a LCD display
- Measured parameters are outputted as 4...20 mA current signal
- Storage of up to 1600 data lines in the *logbook*
- Several probes may be connected to one controller

General

- Measuring principle
  Determination of frequency of a vibrating tube in the X-mode
- Measuring range
  500 to 2.000 kg/m^3
- Typical accuracy (10^{-4})
  ± 0.1 kg/m^3
- Resolution of temperature measurement
  < 0.1 °C
- Communication
  Data exchange with higher-order system via MODBUS, PROFIBUS or Devicenet

Controller

The controller establishes the connection with the density probes, supplies the supply voltage and controls communication.

The LC display serves to indicate the measured parameters and status information plus parameterisation of measuring system.

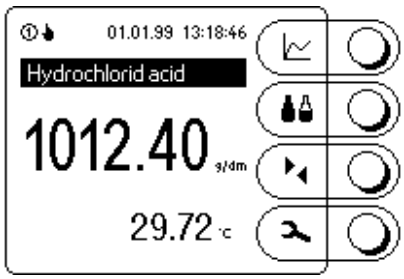
The controller furthermore provides analogue und digital inputs and outputs for data exchange with the higher-order system.

controller

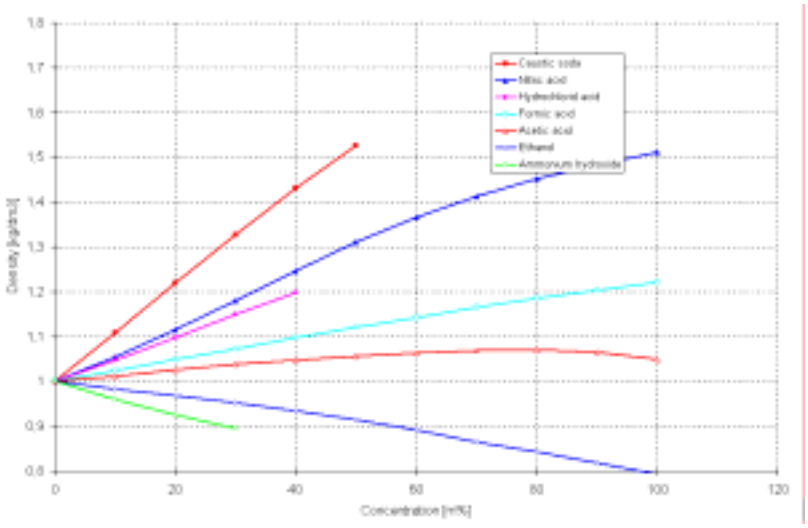
Calculation of normal density and concentration

The controller may calculate the normal density e.g. density of 20 °C or concentration of liquids on the basis of the actual measured density. Fluid-dependent and concentration-dependent temperature compensation will be duly considered.

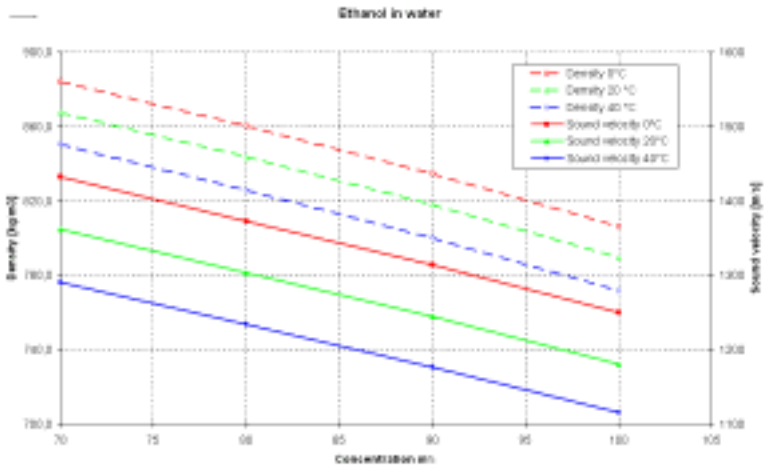
Density characteristics of max. 32 stored products may be stored in the computer and easily selected.



View of the display

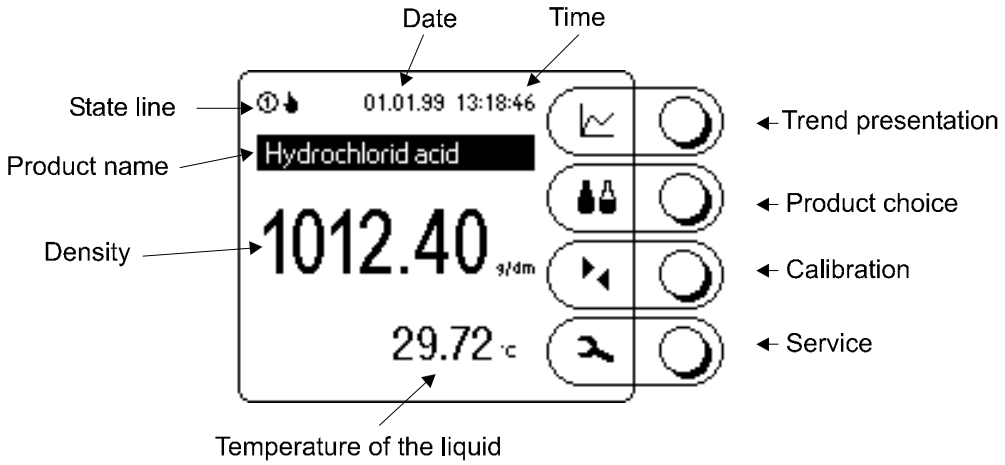


Density and concentration of different liquids

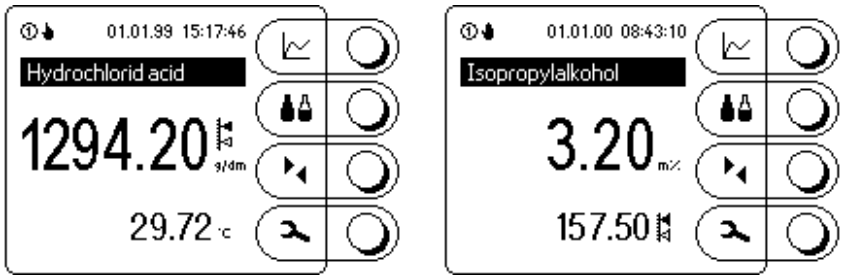


Density as a function of temperature

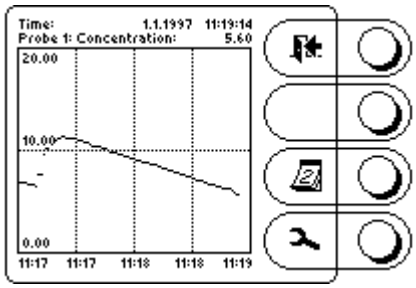
Functions



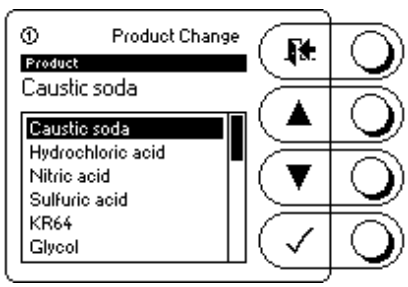
The main view shows the measuring values. A range crossing is shown with a special symbol



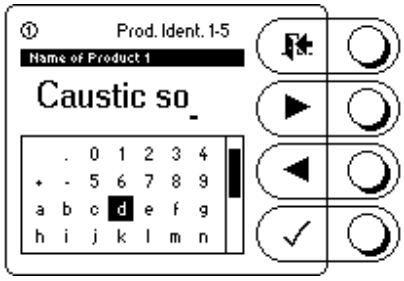
The trend chart offers helpful information and allows optimal process monitoring.



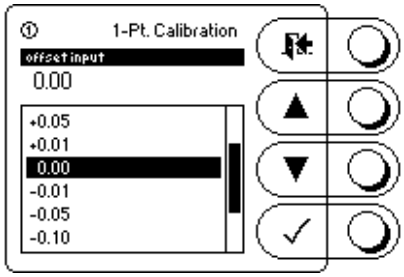
The controller stores the density curves of up to 32 products. It is possible to choice the products and density curves in a choice menu



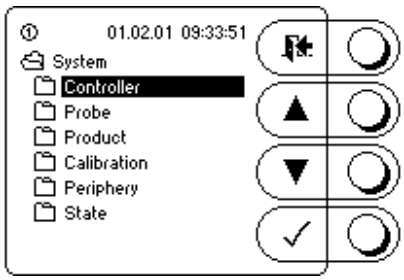
It is also possible to change the name of the product.

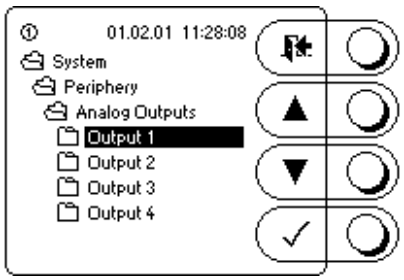


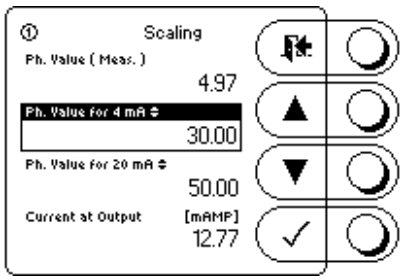
The calculation of the normal density or the concentration can calibrated to achieve optimal process results.



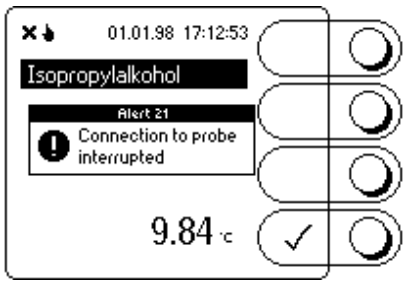
The controller has a lot of parameters and helpful functions. The parameters are structured in a parameter tree.



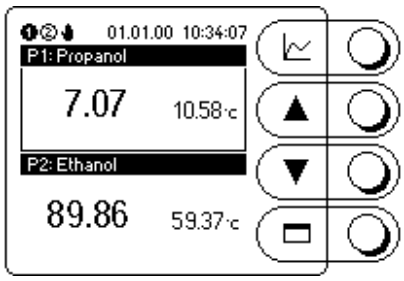


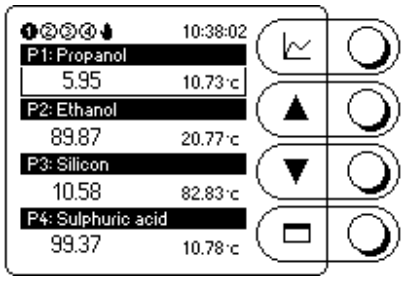


The device has an automatic self check. All error messages are shown in a message box.

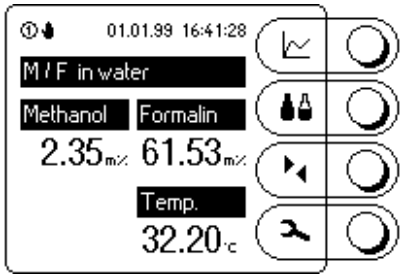


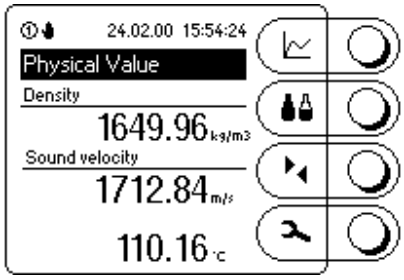
The values of several probes are presented in the 2- or 4-probe view.



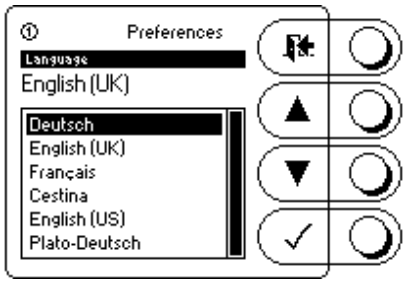


LiquiDens 40 allows the calculation and the display of 2 different concentration in a 3-component-liquid.



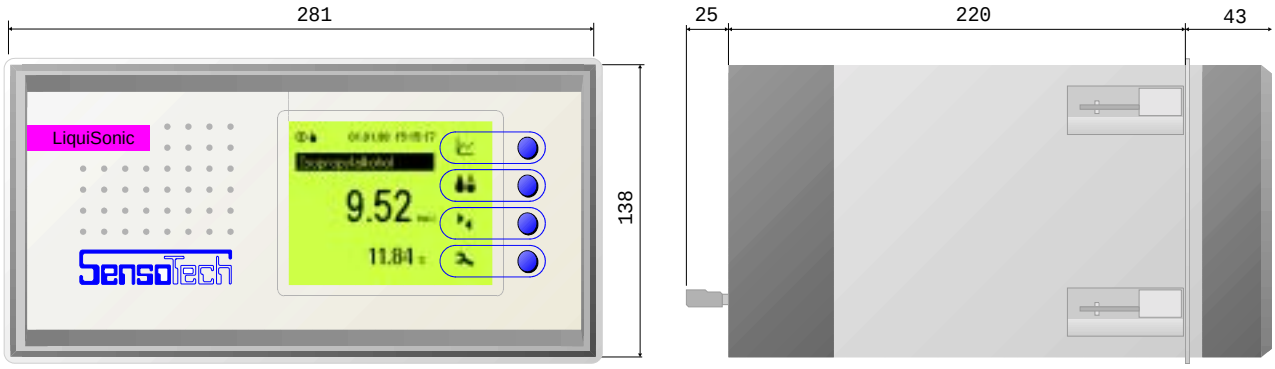


The controller allows the operation in several languages.



Common data

Display	LCD 160 x 128 pixel, lighted background	
Operating	touch keyboard, 4 keys	
analogue outputs	4 x 4.. 20 mA, potentially separated	
digital outputs	4 x switching output 1 x „alarm“ 1 x „service“	
analogue input	4 x 4.. 20 mA, potentially separated	
product choice	manual external parallel external serial automatic	
interface	RS-232	
	optional	
	MODBUS, PROFIBUS, Devicenet	
housing	panel housing, sector: assembly depth: material: color: degree of protection: weight:	281 x 138 (h) mm 245 mm PVC light gray, gray IP 54 approx. 3.5 kg
	optional	
	19“ housing size: material: degree of protection:	 3 HE, 84 TE stainless steel, aluminum IP 54
weight:	approx. 4.5 kg	
power supply	110 - 230 VAC ±10%, 50 or 60 Hz	
	optional 24 VDC	
power consumption	35 W	
range of ambient temperature	0 to 40 °C	
maximum cable length	1,000 m	



controller dimension

wiring (function and code of the several backside terminals)

Number	Term	Remark
1, 3, 5, 7	analogue input + 1, 2, 3, 4	4..20 mA
2, 4, 6, 8	analogue input - 1, 2, 3, 4	4..20 mA
9, 11, 13, 15	analogue output + 1, 2, 3, 4	4..20 mA
10, 12, 14, 16	analogue output - 1, 2, 3, 4	4..20 mA
17, 19, 21	digital input + 1, 2, 3	24 V
18, 20, 22	digital input - 1, 2, 3	24 V
23, 25, 27, 29, 31, 33	digital output A 1, 2, 3, 4, 5, 6	relay
24, 26, 28, 30, 32, 34	digital output B 1, 2, 3, 4, 5, 6	relay
35, 36, 37	RS232 RXD, TXD, GND	coupling PC
38, 39, 40, 41	RS485 +, -, GND, protection	connection to probe
42, 43	24 V +, GND	Supply of probe
44	free	
45	PE	protection wire of controller
46, 47	110 - 230 V L, N, 50, 60 Hz	supply of controller

Density probes

General

- Measuring range
  500 to 2.000 kg/m^3
- Typical accuracy
  ± 0.1 kg/m^3
- Temperature range of fluid
  -40 to 150 °C
- Ambient temperature range
  -5 to 40 °C
- Pressure range
  max. 50 bar
- Material
  high-grade steel 1.4571

  Optional
  Hastelloy 2000 Hastelloy C276, monel, titanium, tantalum
- Degree of protection: IP 65
- Power supply: 24 VDC ±20% (via controller)
- Power input: 5 W
- Weight: 5.0 kg

Fluid connection

- Swagelok 12 mm tube (DN10)
- DIN flange DN15, PN16
- Milk pipe thread Rd 28x1/8“ to DIN 11851, PN10

Notes on installation

Density probes should be installed so that gas bubbles or solid particles cannot flow through the probe.
Stabilization sections are not required. Firm clamp fixtures or supports are not necessary.

Cable

The connecting cable of **LiquiDens** between probes and controller supplies the probe as well as exchanges the information and data. The cable consists of an supply cable and a twisted paired-cable for the BUS.

The cross sectional area of the utility cable depends on the length and the number of probes:

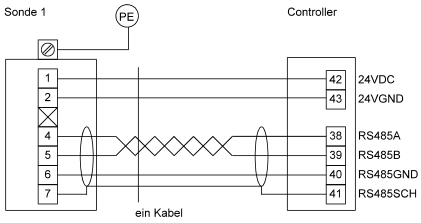
length of cable [m]	1 probe	2 probes	4 probes
100	2 x 0,25 mm^2	2 x 0,5 mm^2	2 x 0,75 mm^2
200	2 x 0,50 mm^2	2 x 0,75 mm^2	2 x 1,50 mm^2
400	2 x 0,75 mm^2	2 x 1,00 mm^2	2 x 2,50 mm^2

The BUS cable has to correspond to the specifications of RS-485. The following cable is recommended:
(2 x 0,25 mm^2 paired, 1 x 0,25 mm^2) Cu screened
This cable is offered as a standard. The cable can be shortened to any length during the installation.

Connection setup to probe controller

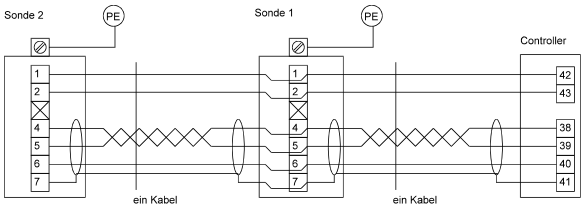
One probe with one Controller

A 24VDC-power supply is integrated in the controller for up to 3 probes (depends on the cable length). The connection is shown as follows:



Several probes with one controller

The connection for several probes is shown as follows:



Communication software

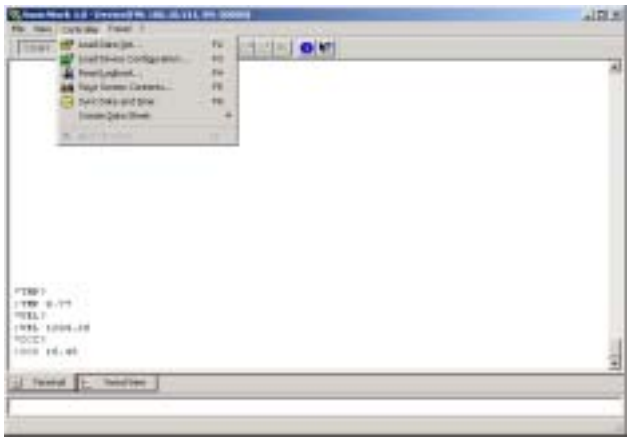
A software package is offered which enables the configuration and communication with the **LiquiDens**-devices from a personal computer.

SonicWork

The software **SonicWork**® is a PC based software with following functions:

- down loading of product characteristic curves
- reading of logbook data
- on-line reading with a PC and trend chart
- device configuration

The program works with Windows 95® 98® 2000® and Windows NT®, XP®



SonicWork, reading of measuring values

SonicWork, trend chart

A cost free version of **SonicWork** 4.0 LE is loadable from the homepage www.SensoTech.com

LiquiSonic

Inline concentration measuring device, ultrasonic based

LiquiSonic

Please ask for “LiquiSonic product description” for further information regarding this instrument.

Further information

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