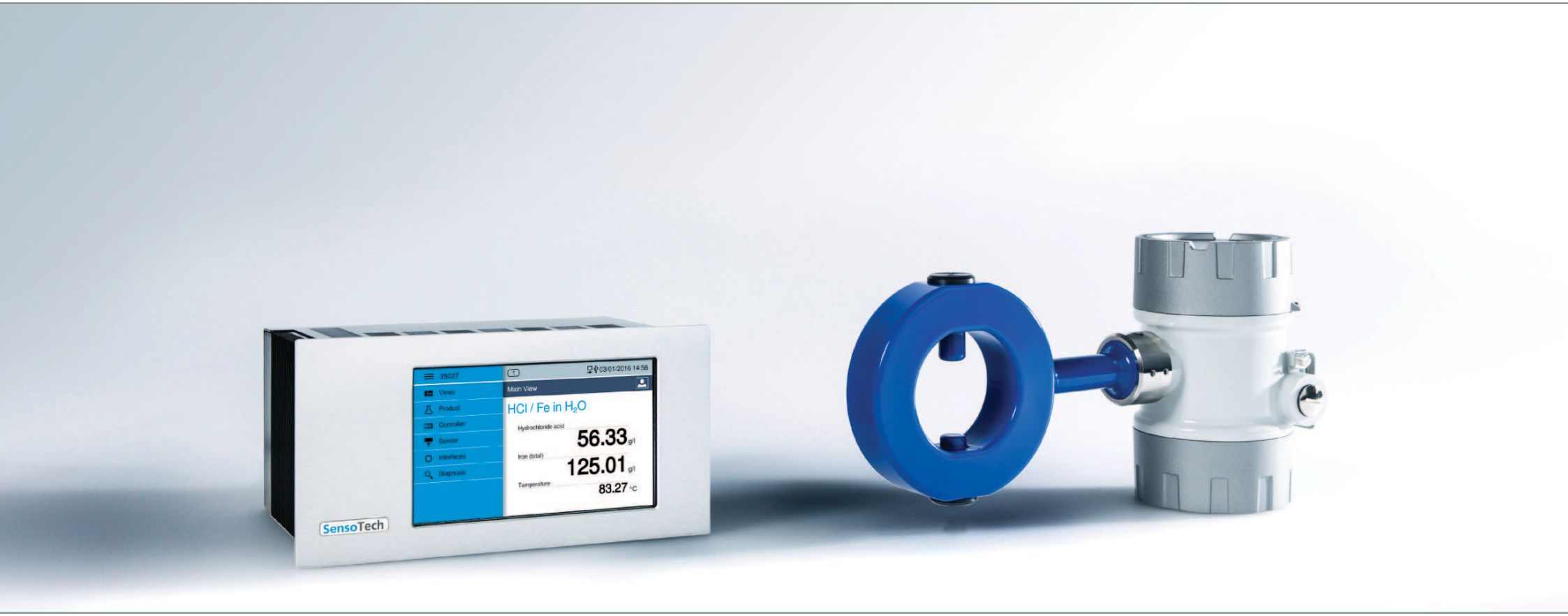
SensoTech
In liquids, we set the measure.



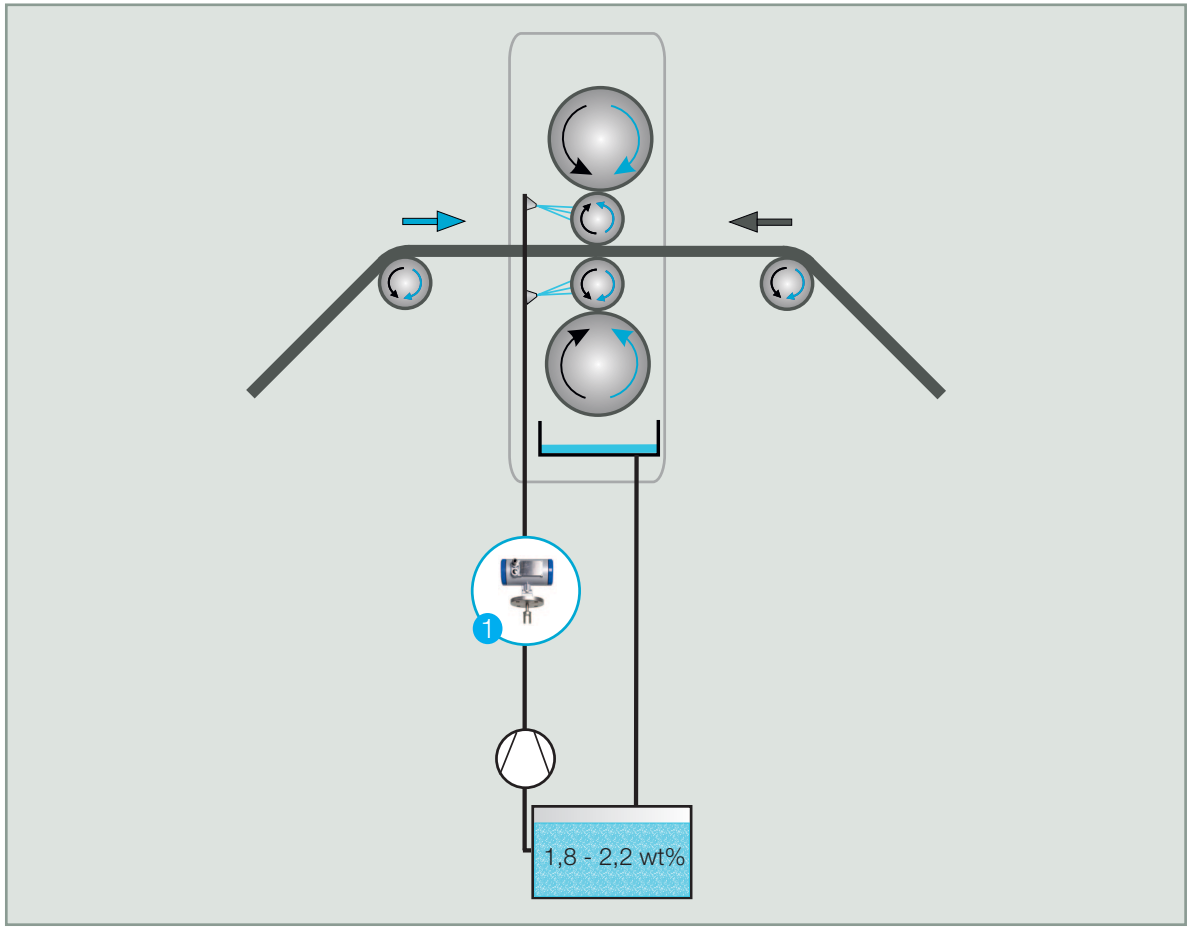
Steel and rolling mills

Contents

Cold rolling

Reversing mill process with LiquiSonic® application

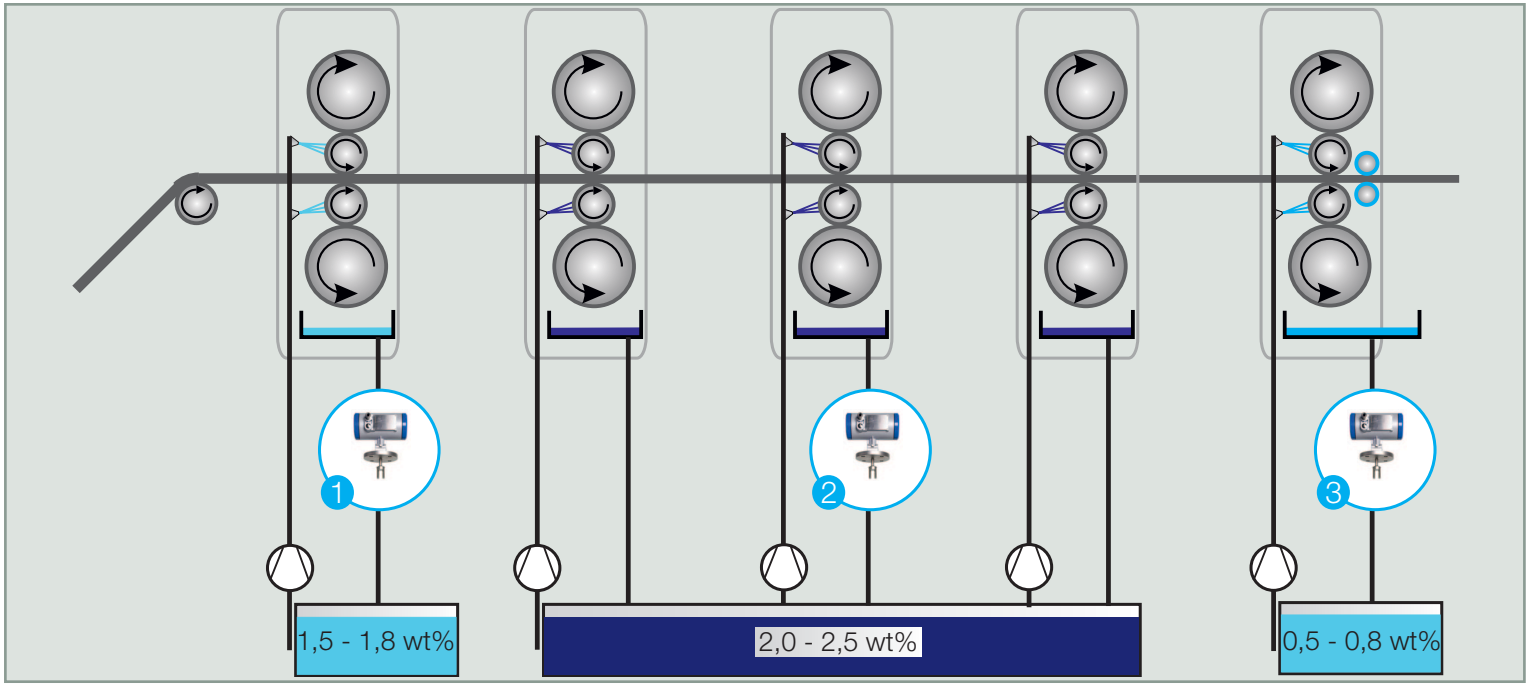
- inline measurement of the emulsion concentration
- control of emulsion refreshment with concentrate
- sensors before spraying nozzles (Q001) for process documentation
- applicable for other metal mills as well (Cu, Zn, Al, brass)



Cold rolling

Tandem mill process with LiquiSonic® applications

- control of emulsion refreshment with concentrate
- sensors before spraying nozzles (Q001-Q003) for process documentation
- applicable for other metal mills as well (Cu, Zn, Al, brass)



Cold rolling

Cold rolling oils

Type	Producer
Quakerol	Quaker
Gerolub	Henkel
Rollub	Houghten
Prosol	Esso
Total	Total

LiquiSonic® system for emulsion control

Benefits

- direct control of emulsion concentration in several circulation loops behind the filters
- avoid loss in quality by less oil concentration
- save money by avoiding higher oil concentration than necessary
- continuous documentation of the process for quality assurance system and external documentation
- payback:
  - approx. costs for concentrate: 2.56 €/l
  - actual concentration consumption of 100 l/h → can be reduced with concentration control by 5 %
  - 5 % per day of reduction means 307.20 € less costs per day

LiquiSonic® system for emulsion control

References

ArcelorMittal

corus

HYUNDAI HYSCO

KME THE EVOLUTION OF COPPER

ThyssenKrupp

SMS SIEMAG SMS group

Close cooperations with emulsion suppliers

Henkel

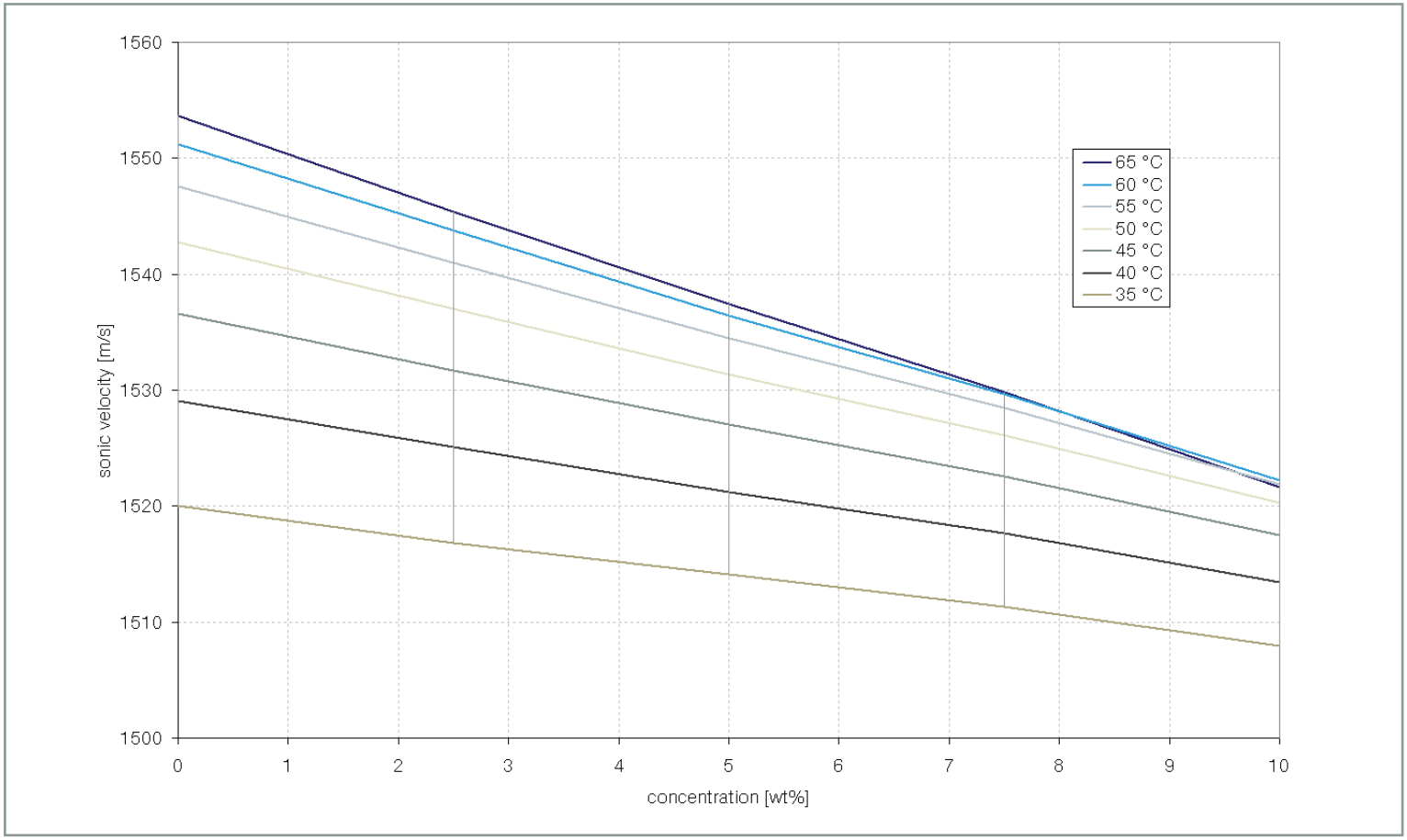
HOUGHTON

Quaker

LiquiSonic® system for emulsion control

Sonic velocity and concentration

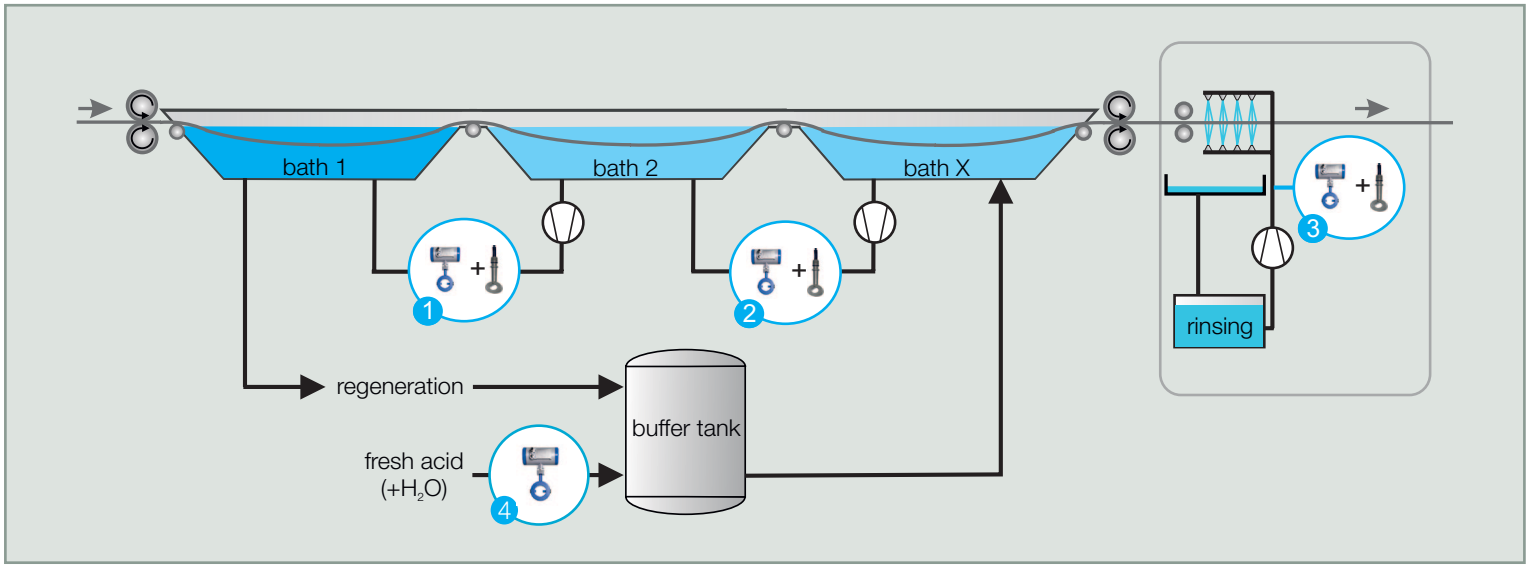
- cold rolling oil: 0 to 10 wt%, 40 to 60 °C (e.g. Gerolub 6515)



Pickling bath

Process with LiquiSonic® applications

- downstream of the rolling process and other fields of the metalworking industry
- different numbers of baths in one line
- remove, modify, passivate or clean surfaces in a defined manner
- mixture of mineral acids and iron salt
- the concentration of acids decreases and the salt increases during the pickling process



LiquiSonic® system for pickling bath control

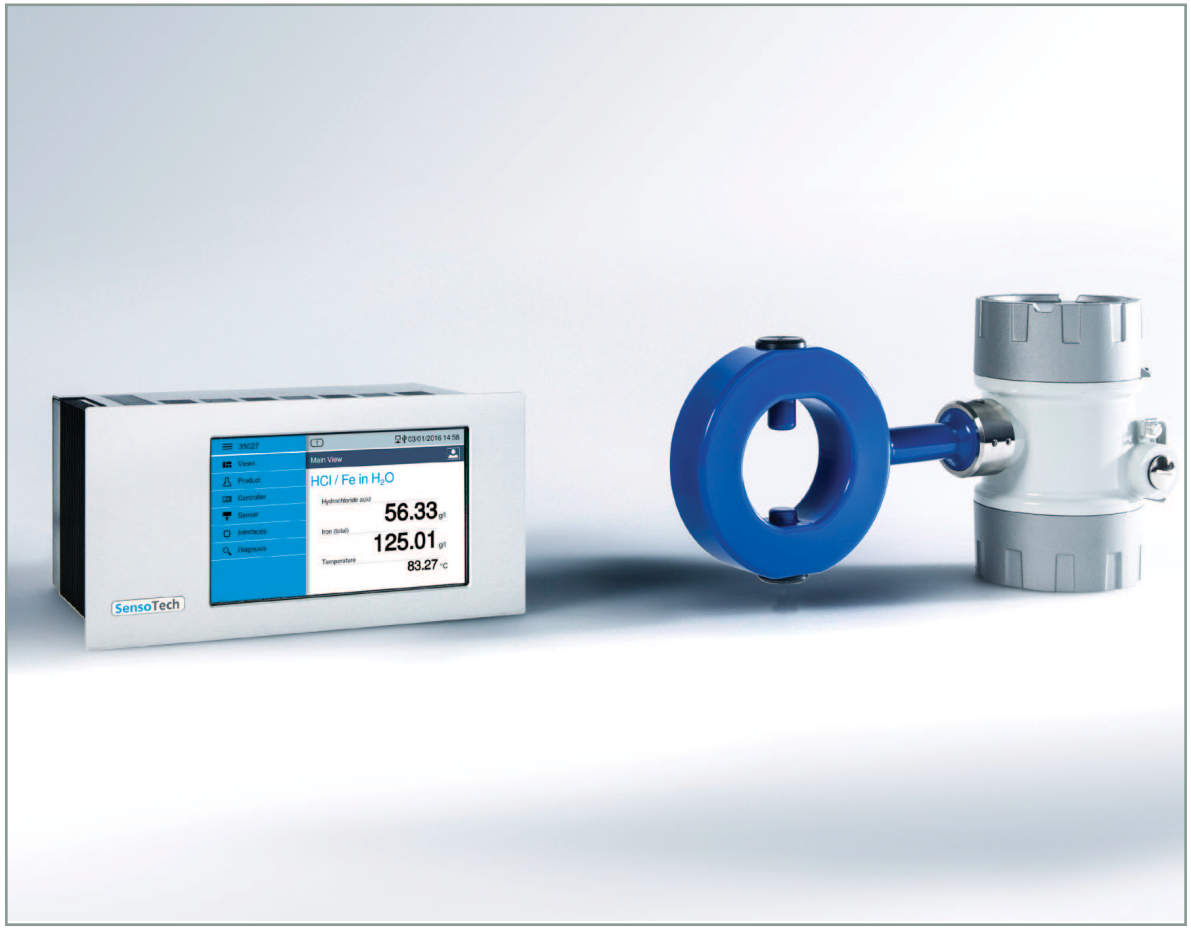
Benefits and applications

Benefits

- fresh acid re-dosing control
- flushing bath monitoring
- detection of acid irruption in process water
- continuous, optimum pickling bath quality

Applications

- sulfuric acid (H_2SO_4)
- hydrochloric acid (HCl)
- nitric acid (HNO_3)
- hydrofluoric acid (HF)



LiquiSonic® system for pickling bath control

References

AMAG Austria Metall

ESSAR

JSW

NUCOR

SMS SIEMAG SMS group

TATA

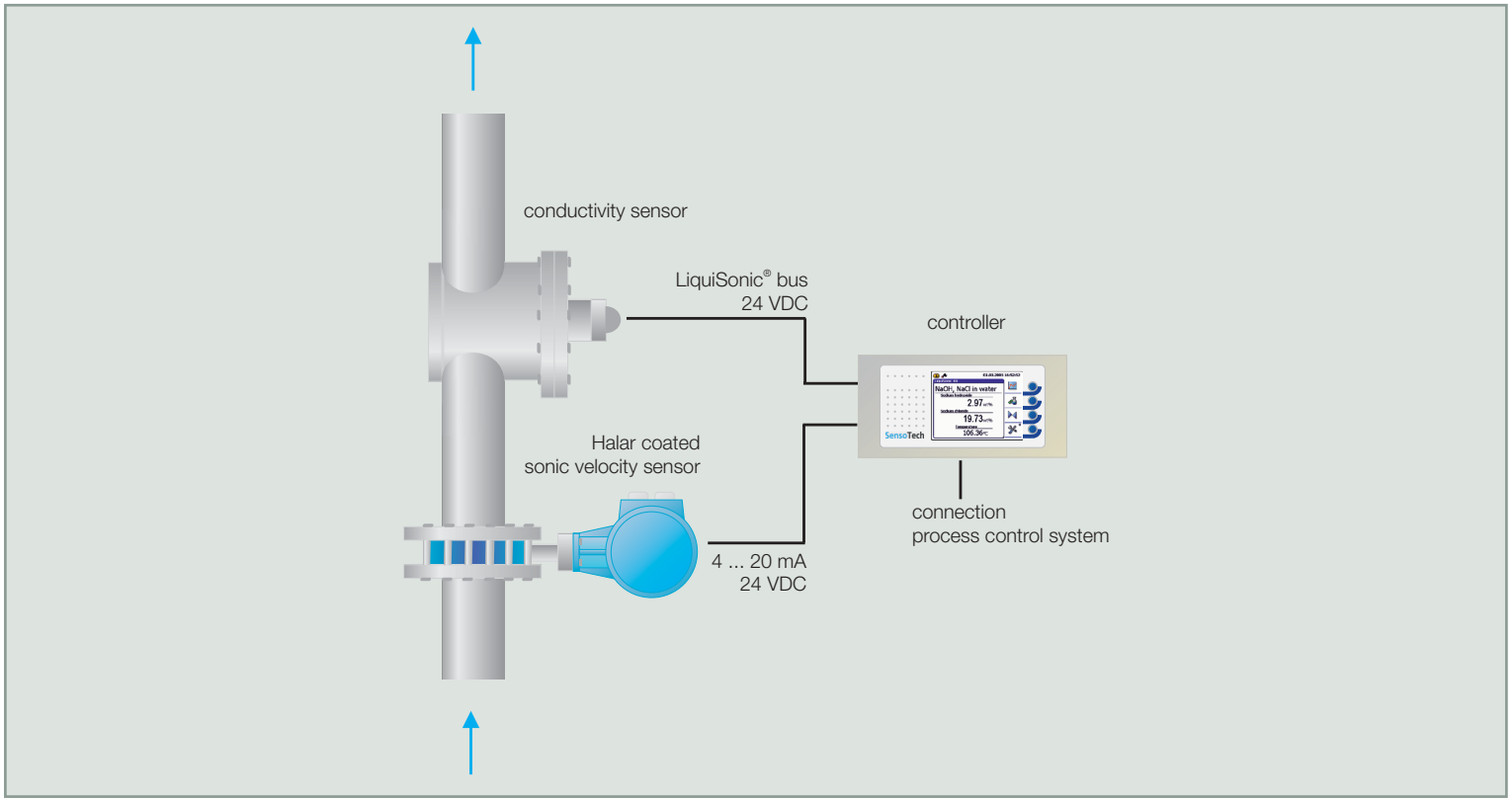
ThyssenKrupp

Wuppermann AG

LiquiSonic® system for pickling bath control

3-component measurement

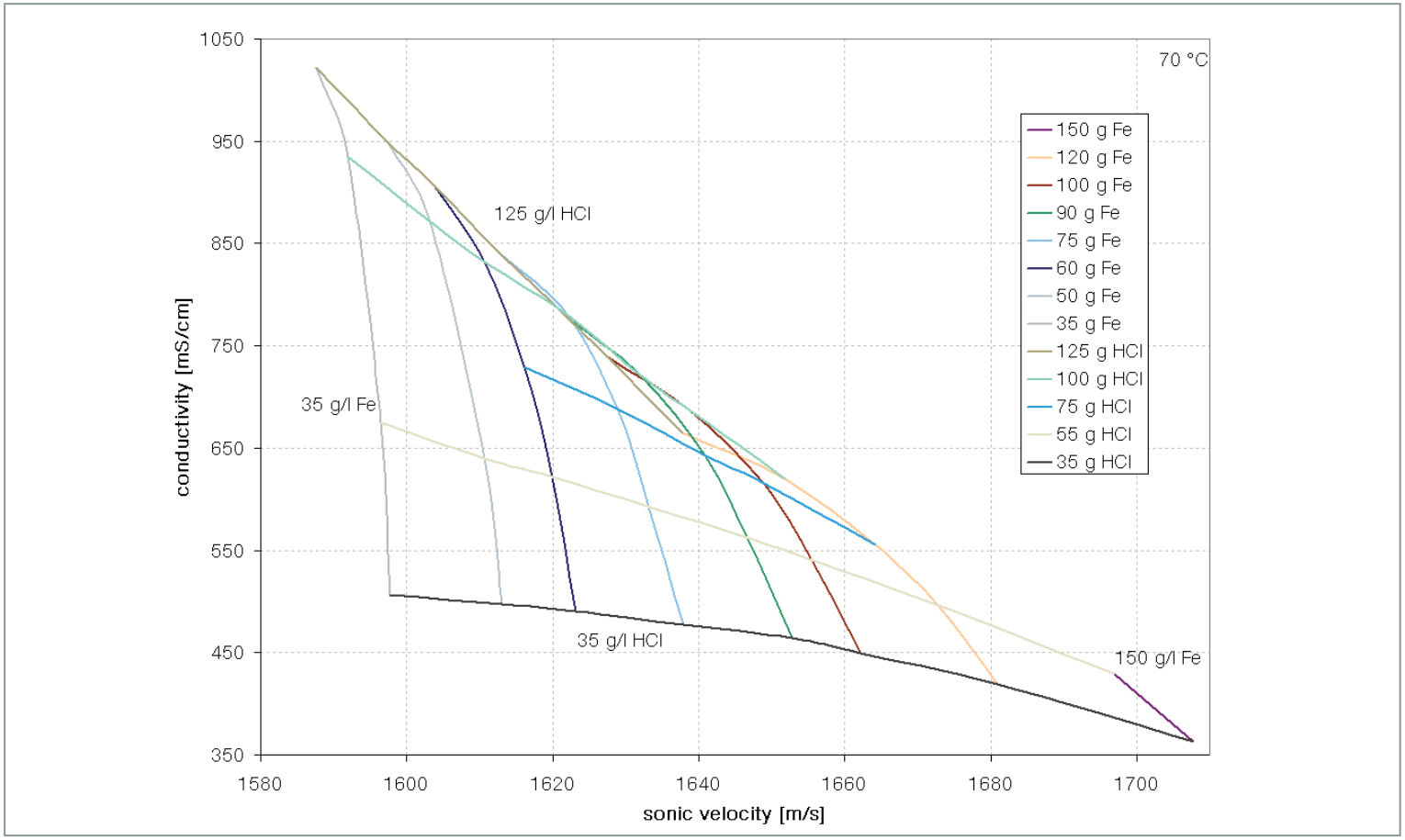
- LiquiSonic® 40 with sonic velocity in combination with conductivity
- Halar-coated ultrasonic sensor and PEEK-coated conductivity sensor for maximum corrosion resistance



LiquiSonic® system for pickling bath control

Sonic velocity and conductivity

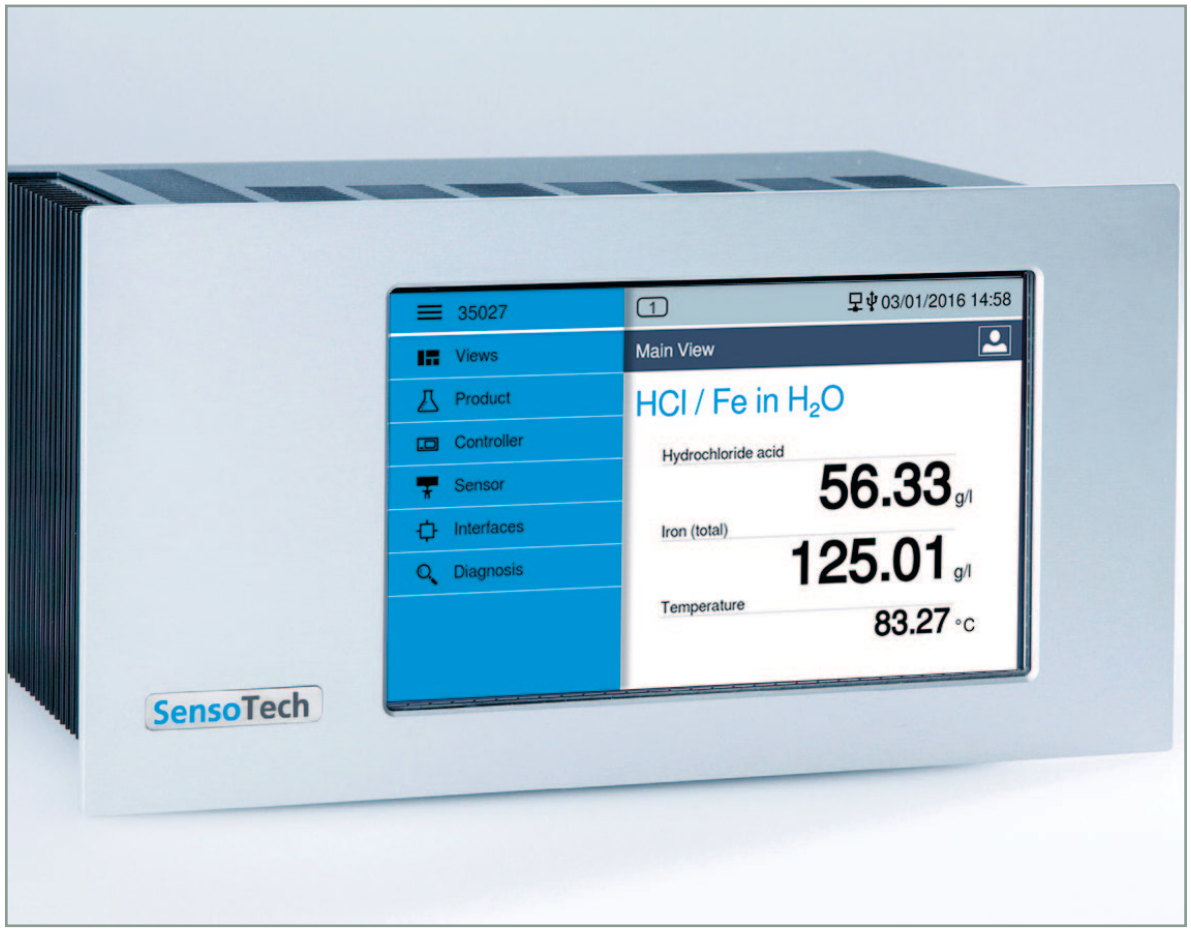
- inflection point in working range is possible



LiquiSonic® system for pickling bath control

LiquiSonic® 40

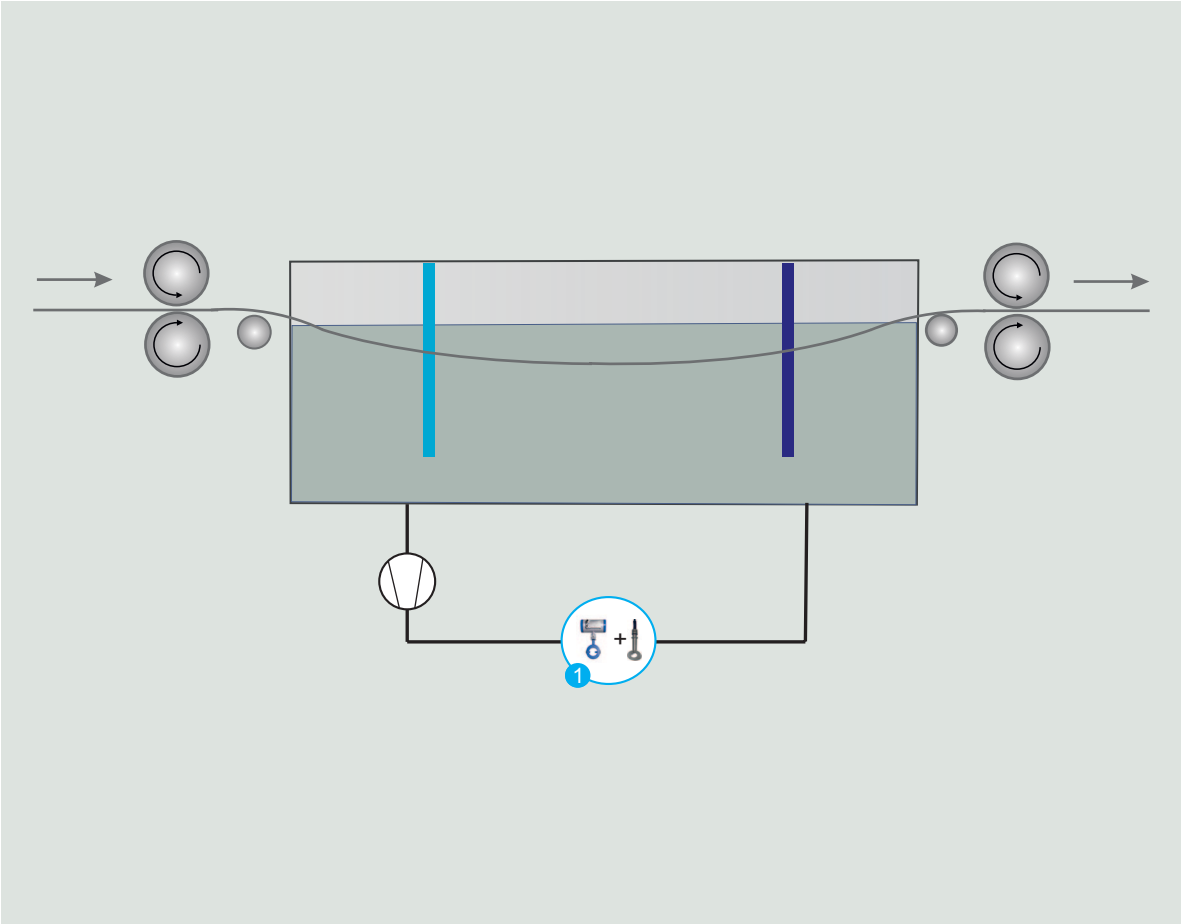
- for pickling bath applications
- 3-component analysis (e.g. Fe/HCl in water)
- input values are sonic velocity, conductivity and temperature



Electrolytic galvanizing

Process with LiquiSonic® application

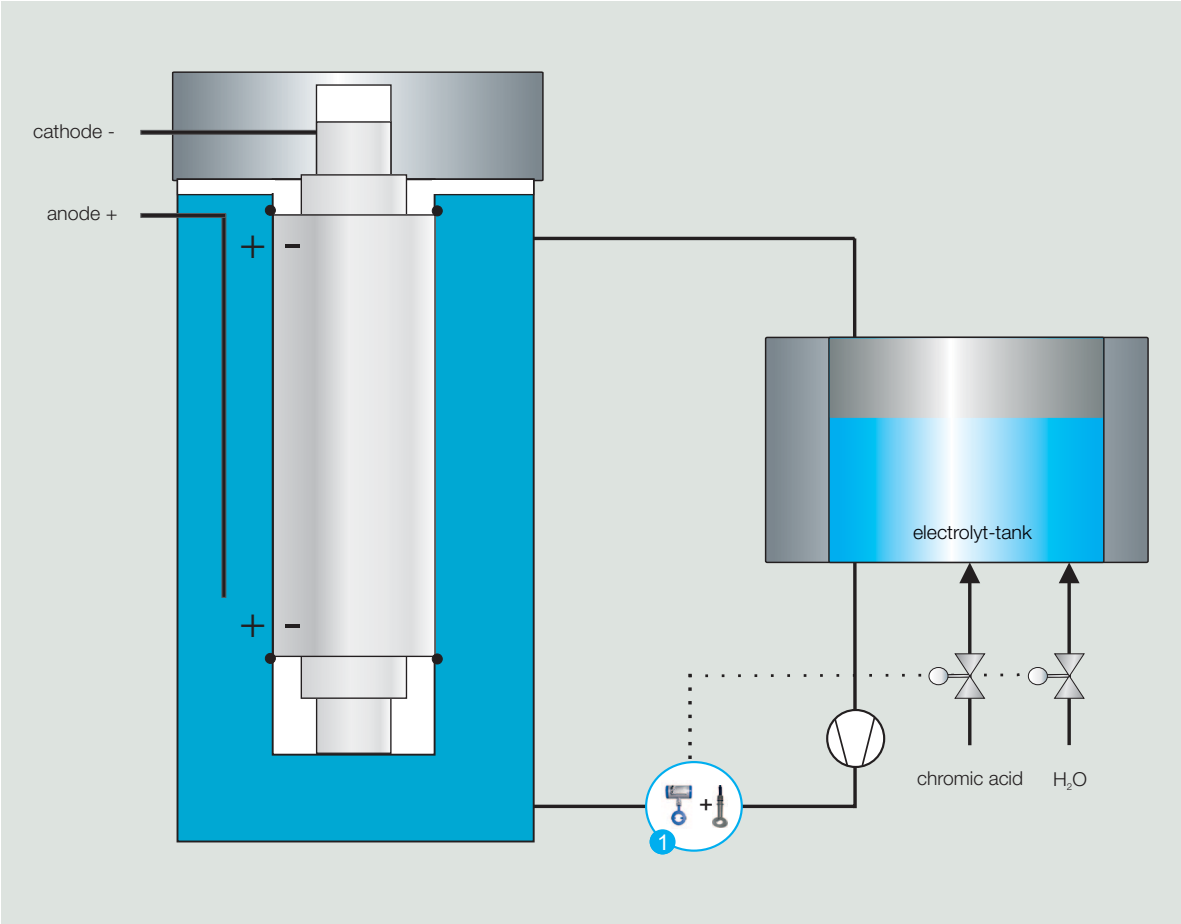
- determination of the several concentrations of the electrolyte, e.g. $ZnCl_2$ and KCl
- regulation of re-dosing
- application of LiquiSonic® 40 (combination of sonic velocity and conductivity)



Roller chrome plating

Process with LiquiSonic® application

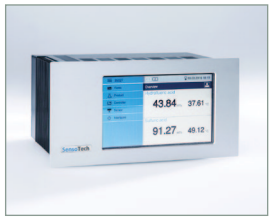
- determination of concentration of sulfuric acid and chromic acid (H_2SO_4 / H_2CrO_4 in H_2O)
- application of LiquiSonic® 40 (combination of sonic velocity and conductivity)

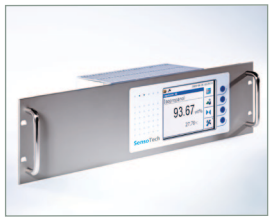


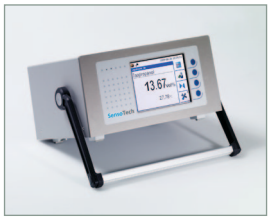
Controller

Measuring data to analyze and monitor

- panel mounting casing
- material: powder-coated steel
- front panel: anodized aluminum
- display protection: glass
- protection degree: IP30 (NEMA 2), front: IP65 (NEMA 4)
- display: capacitive touch screen, 7“, 800 x 480 pixel (16 Mio. colors)
- front panel: 260 x 133 mm (10.2“ x 5.2“)
- panel cut-out: 242 x 122 mm (9.5“ x 4.8“)
- installation depth: 250 mm (9.8“)
- operation via touch display or browser







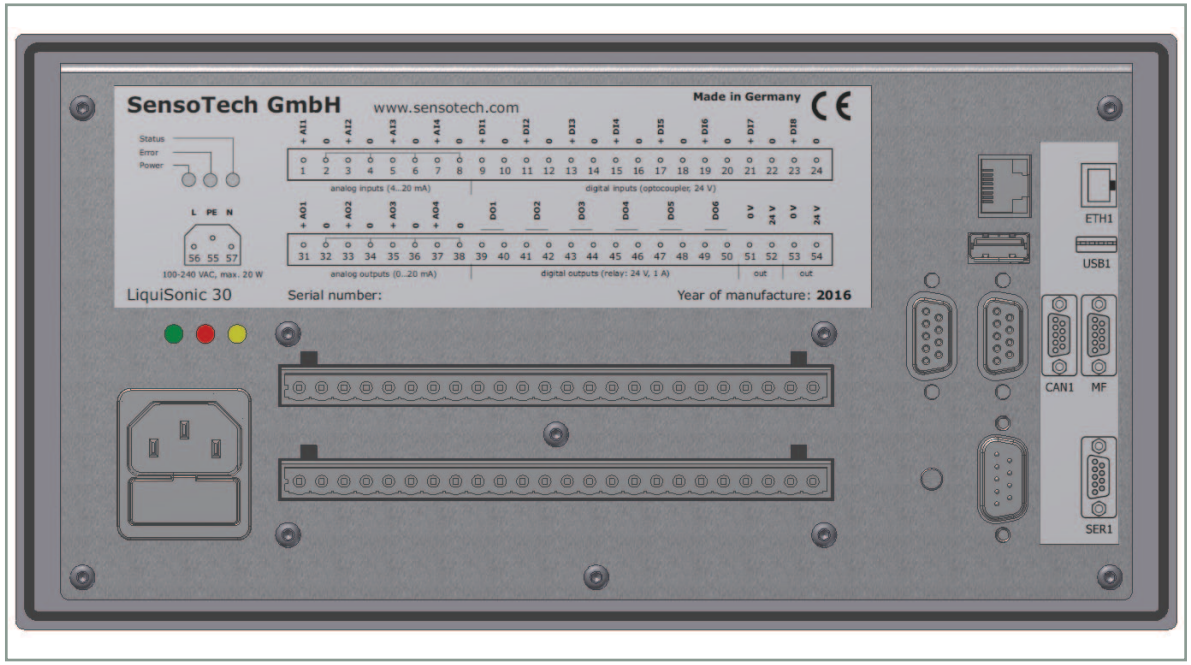
Controller

Connection side

- simple assembling
- plug in clamping contacts

In- and outputs

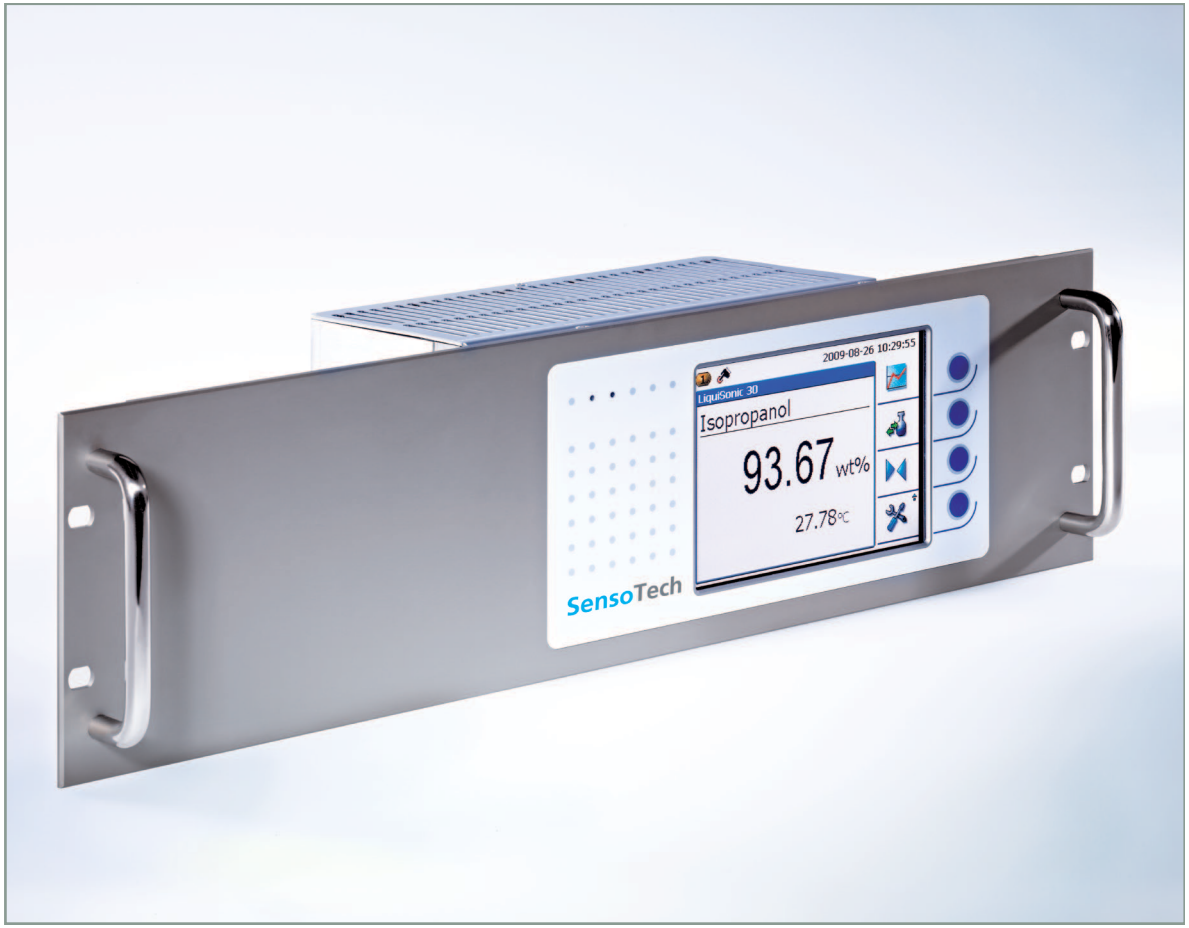
- analog outputs: up to 4 x 4..20 mA
- digital outputs: up to 6 x electronic relays
- analog inputs: up to 4 x 4..20 mA
- digital inputs: 8 x binary inputs
- USB interface
- serial interface RS-232
- inputs and outputs isolated
- supply 100 V AC to 240 V AC or 24 V DC
- optional:
  - network (Ethernet)
  - fieldbus interface (Profibus DP, DeviceNet, Modbus RTU, Modbus TCP/IP)



Controller

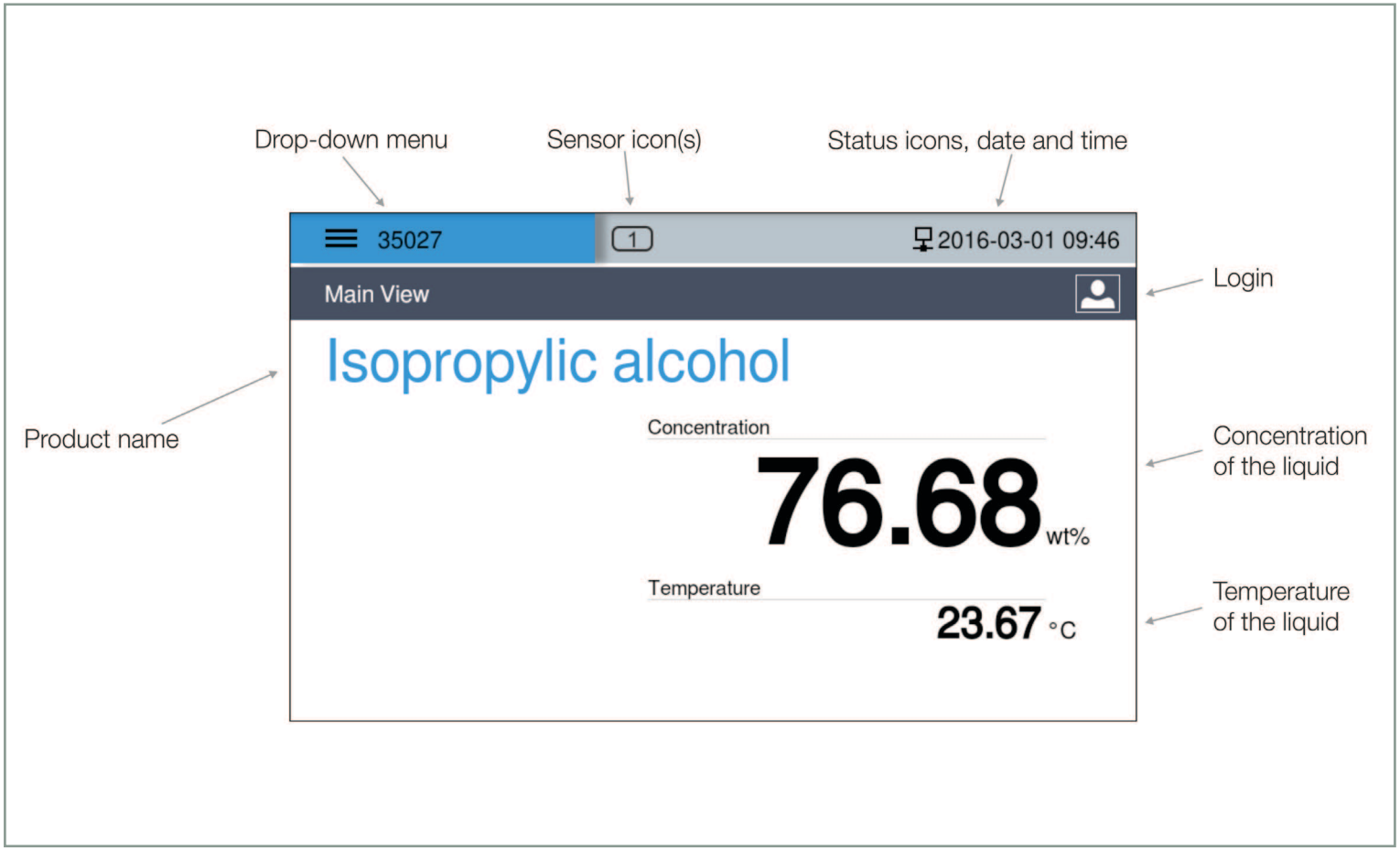
19“ rack mounting version

- dimension: 19“, 3 RU
- installation in a 19“ standard frame



Controller

Main view



Controller

Main view

standard
Sensor is connected and operates properly.

connection fault
Sensor is not connected.

stop
There is no liquid flow around the sensor.

no liquid, gas bubbles
The sensor is not in the liquid, or too much gas bubbles, foam or solids are present on the sensor.

USB
USB flash drive is connected.

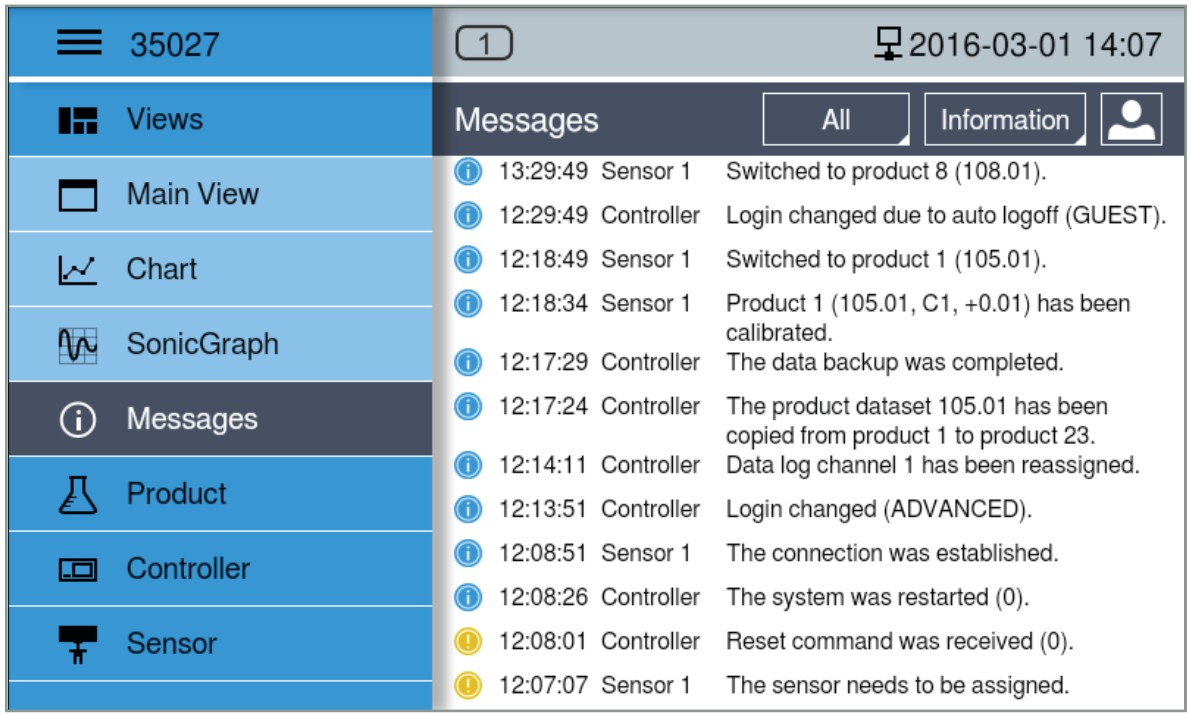
network
Network is on.

network error
Network connection is interfered.

Controller

Event memory

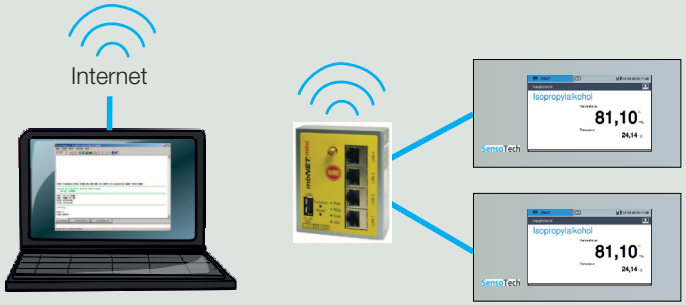
- important events and operations are automatically traced within the event memory:
  - errors
  - warnings
  - login and logout of users
  - product change
  - calibration
- the events are presented on the display and can be read out



Controller

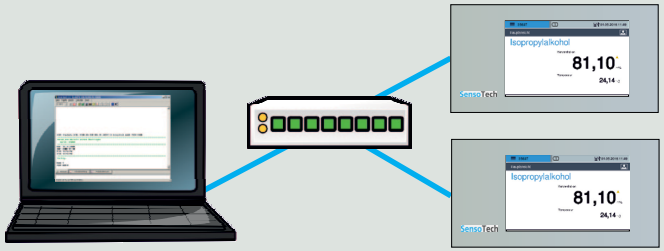
Overview of remote connections

TCP/IP connection (VPN via UMTS/3G router)



necessary options/accessories:
- network integration incl. web server
- UMTS/3G router

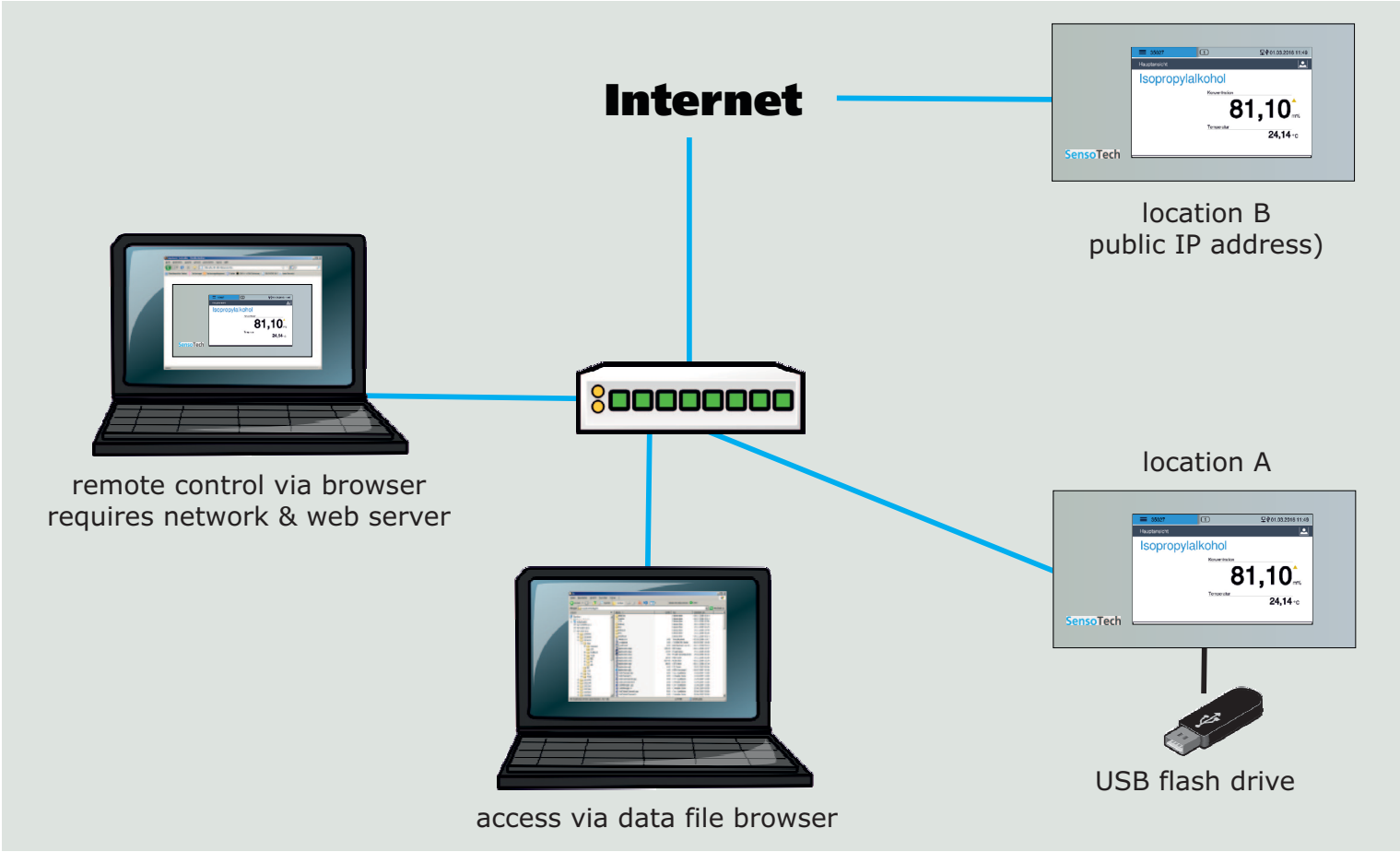
TCP/IP connection(Ethernet)



necessary options/accessories:
- network integration

Controller

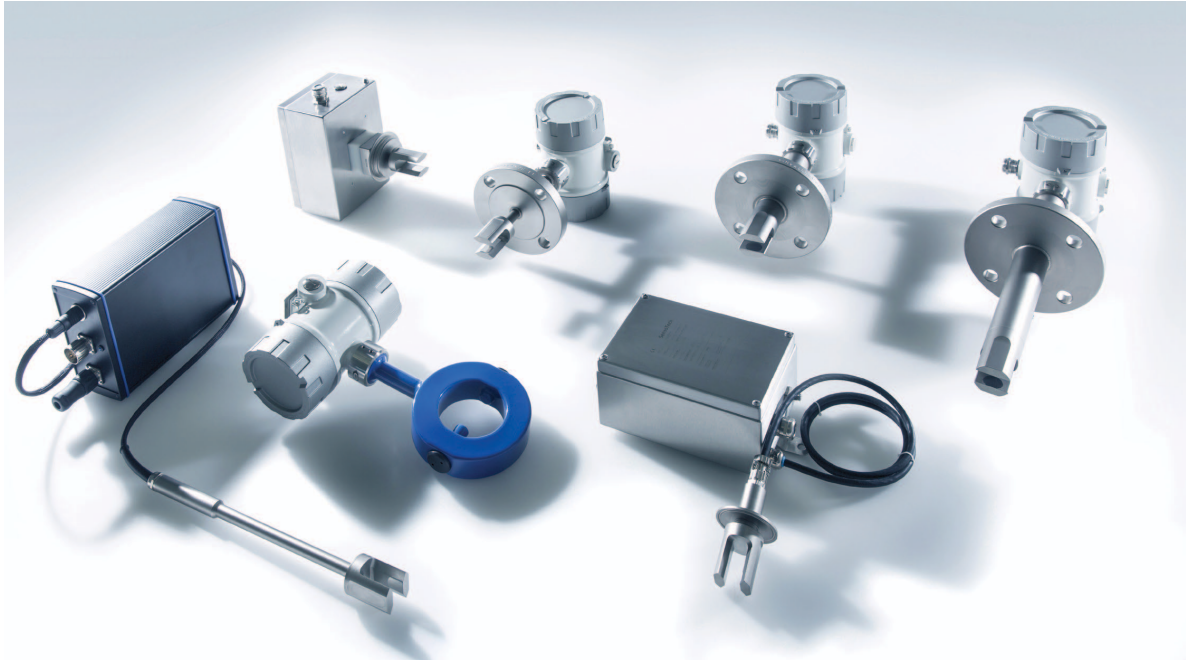
Overview of network integration

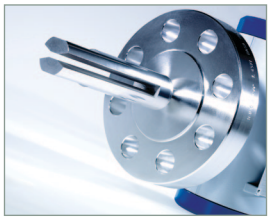


Sensors

Measuring can be so simple

- absolute sonic velocity as a well-defined and retraceable physical value
- installation directly in main pipes or vessels
- contact less measuring method independent of color, conductivity and transparency of the process liquid
- rugged construction in completely metallic sensor design without gaskets or moving parts
- drift- and maintenance-free
- corrosion resistance by using special materials
- connection of up to 4 sensors per controller
- forwarding of measuring results via fieldbus, (Profibus DP, Modbus), analog outputs, serially or Ethernet





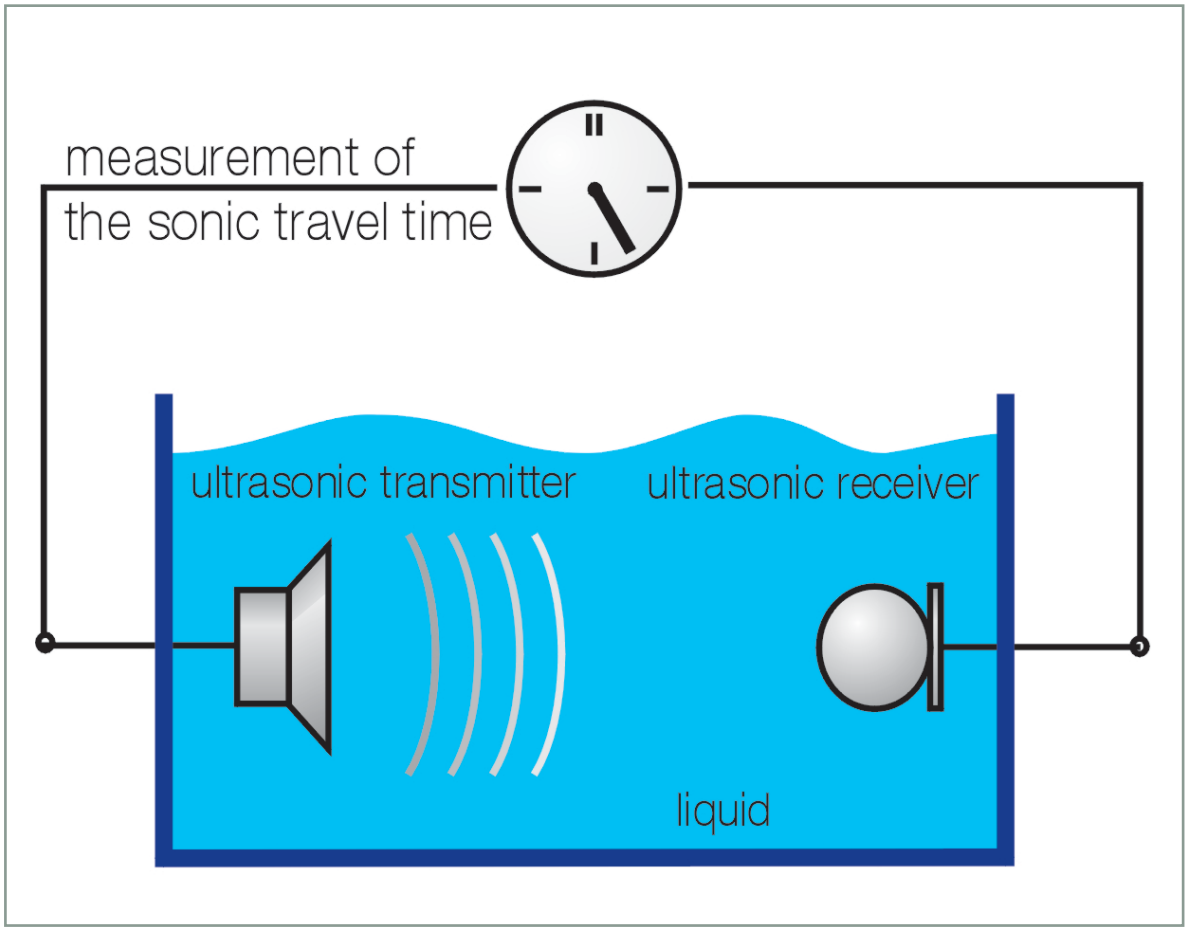
Sensors

Measuring method

- measurement of the propagation velocity of ultrasonic waves in a liquid:

$$v = \frac{s}{t}$$

v: sonic velocity
s: distance
t: travel time



Sensors

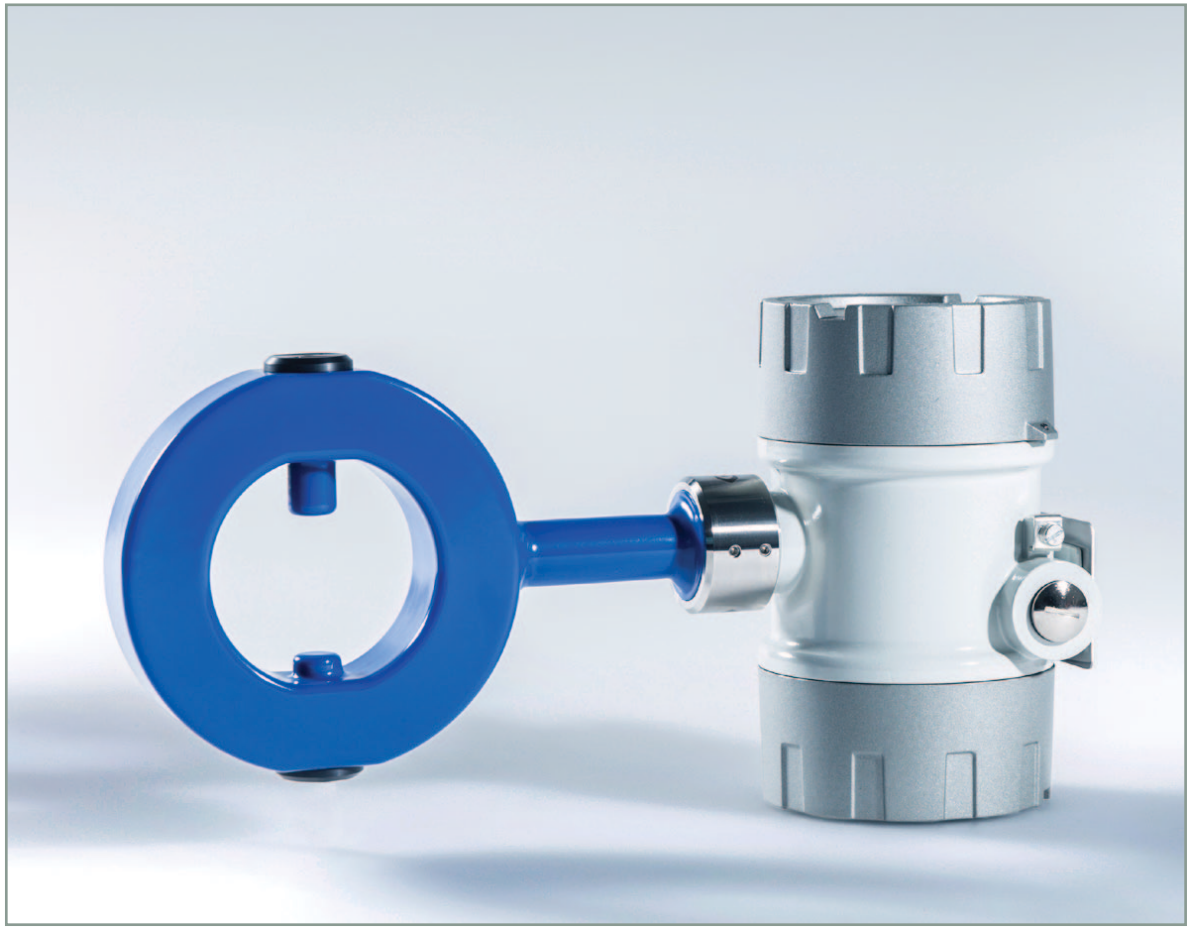
Immersion sensor 40-14

- process connection as DIN, ANSI or other flanges possible
- immersion lengths up to 3 m
- highly efficient ultrasonic ceramic in case of high content of gas bubbles
- standard material: stainless steel 1.4571
- Hastelloy C-2000 as material for corrosion resistance

Sensors

Flange sensor DN 80 Halar (coating)

- very good corrosion resistance against acids
- maximum temperature up to 100 °C
- material is HALAR
  (E-CTFE = Ethylene-Chlortrifluoro-ethylene)
- highly efficient ultrasonic ceramic in case of high content of gas bubbles



Sensors

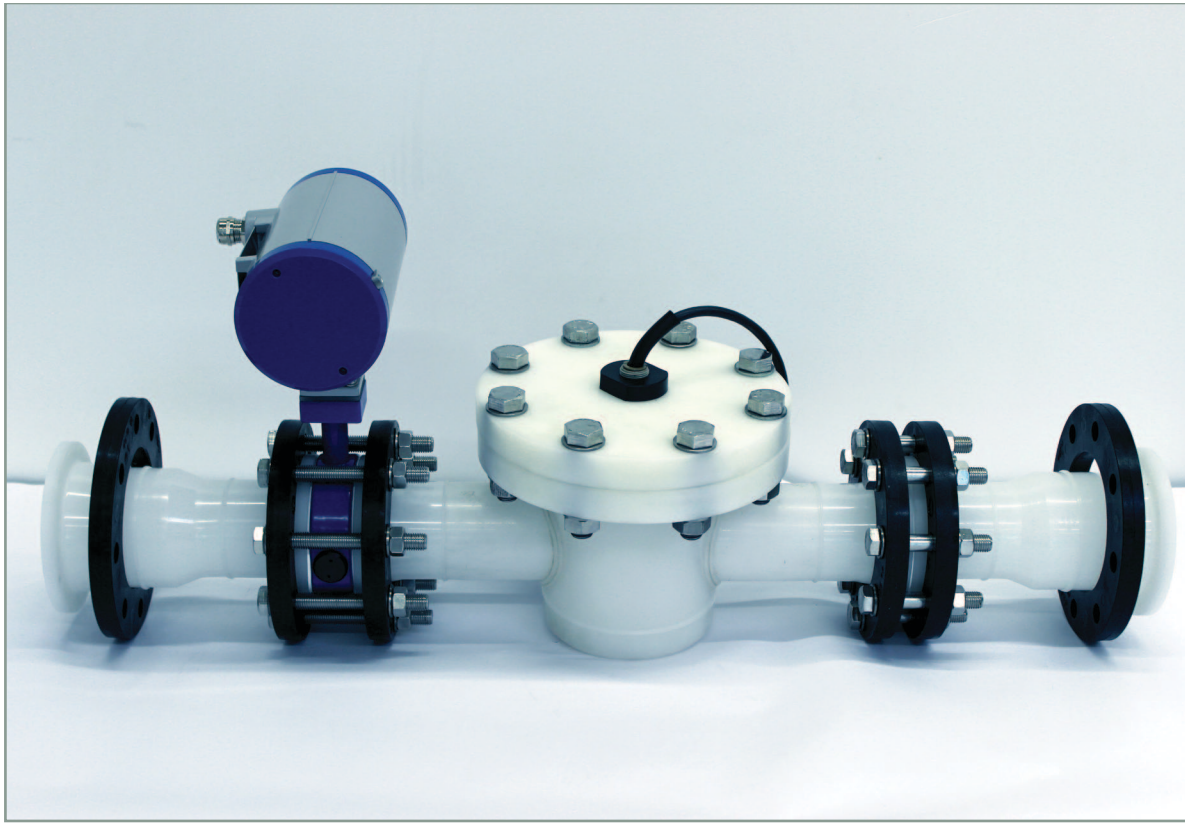
Conductivity sensor

- very good corrosion resistance against acids
- maximum temperature up to 100 °C
- material is PEEK (polyaryletheretherketone)
- minimum influence of sediments on measurement in refer of bigger cycle

Accessories

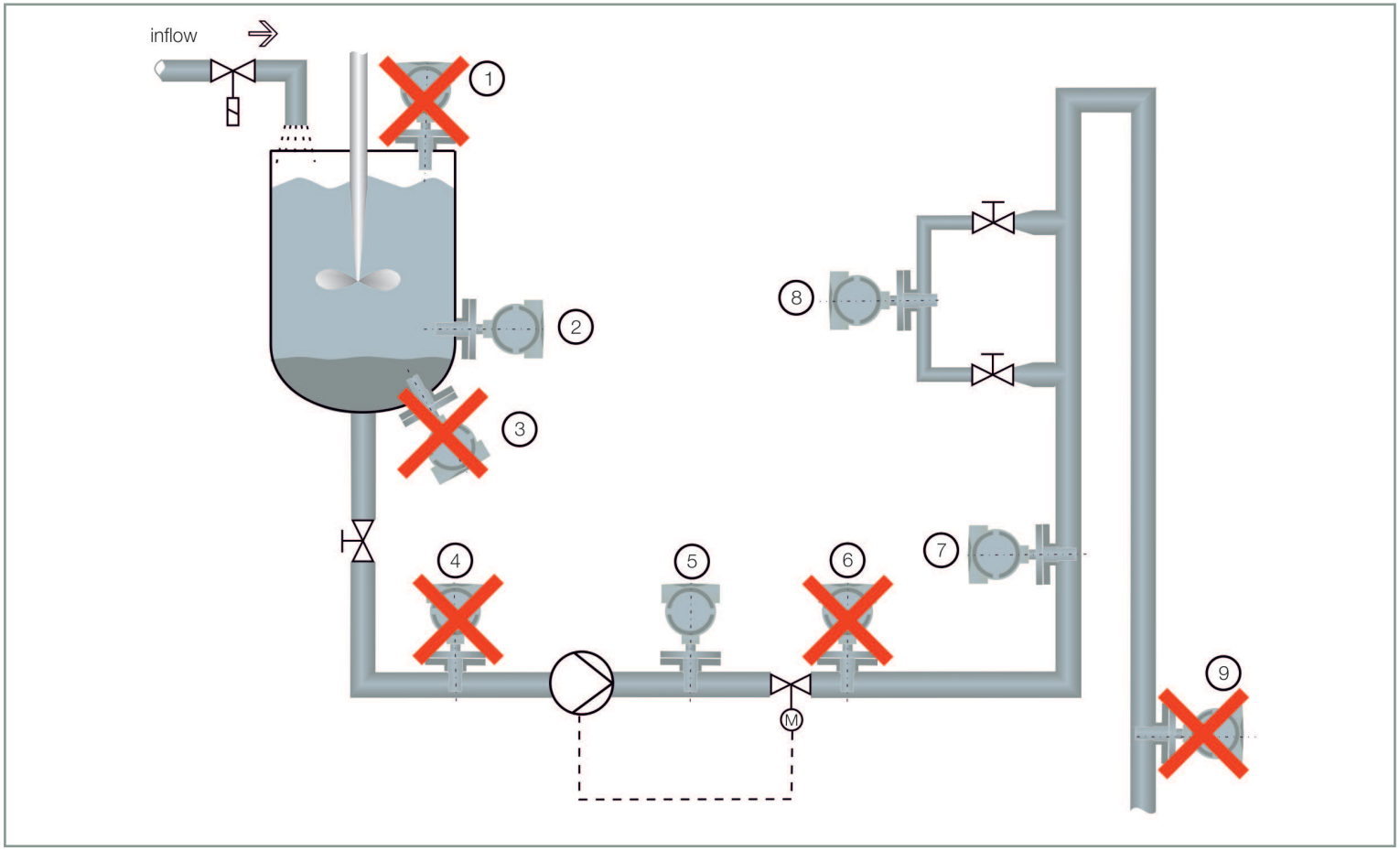
Installation adapter for pickling baths DN 80, 3“ or 4“

- plastic adapter kit for installation of a LiquiSonic® flange sensor DN 80 and a conductivity sensor in a pipeline of DN 80, 3“ or 4“
- components:
  - 1 adapter for conductivity sensor
  - 2 pipeline adapters
  - gaskets
  - mounting accessories
- material: PVDF
- maximum operating temperature of 100 °C
- maximum operating pressure of 0,8 bar



Sensor installation

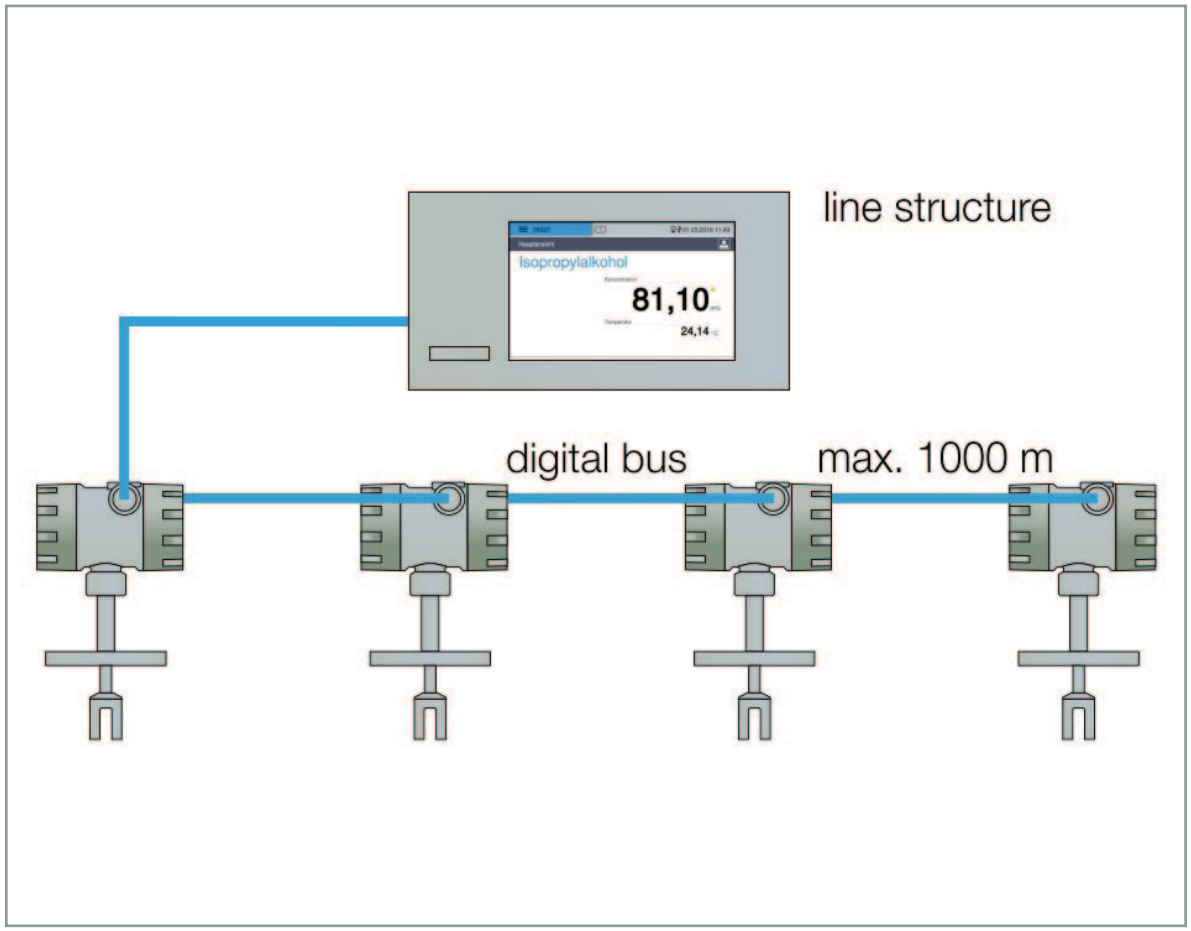
Recommendations for installation



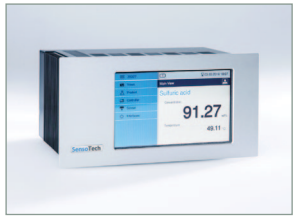
Bus wiring

Line connection

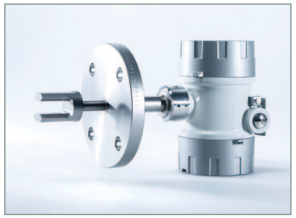
- digital bus connection between controller and sensors
- standard up to 1000 m cable length (optional longer than 1000 m)



We are committed to quality in every way.

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SensoTech

In liquids, we set the measure.

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