Process Analysis with Ultrasound

The process analyzator PIOX® S determines process parameters such as the concentration or the density of liquids using ultrasound. The measurement is based on the determination of the velocity of sound in the liquid. The parameters needed for process control are calculated by the transmitter PIOX TS on the basis of the medium's temperature and of the characteristic curves pre-programmed into the instrument. A simultaneous measurement of concentration and flow is possible.

The measurement can be realized with a wetted sensor or with clamp-on transducers. With clamp-on transducers, a measuring point calibration is usually necessary. The wetted sensor is particularly suited for concentration measurements in batch reactors and stirring machines. It produces a very precise measurement. The factory calibration makes zeroing procedures unnecessary and the operating point does not need to be set. Measurement can begin immediately after installation.

PIOX TS stands out with its powerful dual-µP technology with Digital Signal Processing (DSP) and delivers highly dependable results even under the most difficult measurement conditions. It is perfectly suited for controlling complex processes: the inputs and outputs allow for a flexible configuration and up to two sound velocity sensors can be connected.

The needed temperature measurement can take place via a connected temperature probe, or a temperature proportional signal must be fed in (4-20 mA input or via the RS485 interface). A temperature probe is integrated in the wetted sensor.

Typical Applications:

- quality control, purity control
- product detection
- concentration monitoring
- hygienic concentration measurement
- process control in polymerization, crystallization, neutralization and phase separation processes
- determination of the original wort, sugar content, °Brix, Plato

Wetted sensor CP1N

Clamp-on transducer M2N

Features

Measurement with Clamp-On Transducers:

- no contact with the medium, no more special materials necessary, hygienic measurement
- ideal for chemically aggressive, toxic, explosive or mechanically abrasive media
- no ion contamination, suitable for ultra pure media
- maintenance free, no wear and tear

Measurement with Wetted Sensor:

- factory calibration
- high accuracy

Technical Data

General	
Measuring principle:	Concentration measurement basing on an ultrasonic transit-time measurement
Possible measurement quantities:	Concentration, density, viscosity, turn-over degree, solid content, crystallized content, polymerization degree, precip-itation degree, sludge content, etc...
Measurable fluids:	acoustically conductive fluids with <10% gaseous or solid content in volume

Clamp-On Transducers	
Measuring range, sound speed:	300 m/s ... 3000 m/s
Accuracy:	0.25% of reading ± 0.1 m/s
Resolution:	0.01 m/s
Repeatability:	0.15% of reading ± 0.01 m/s
Degree of protection:	IP65, contact FLEXIM for special IP68 versions
Temperature range:	-30°C ... +200°C acc. to sensor type
Diameter range:	DN 6 ... DN 6500 acc. to sensor type
Pipe materials:	all acoustically conductive materials

Wetted sensor CP1N	
Measuring range, sound speed:	300 m/s ... 3000 m/s
Accuracy:	0.03% of reading ± 0.04 m/s
Resolution:	0.005 m/s
Repeatability:	0.01% of reading ± 0.01 m/s
Temp. measurement:	Resolution: 0.005 K
	Accuracy: 0.1 K
Medium temperature:	-20°C ... +140°C
Operating pressure:	PN40 or acc. to process connection
Dimensions:	see drawings
Process connection:	DIN flange (DN40, 50, 80, 100; PN10...40)
Material:	Stainless steel 1.4571, Titan, Hastelloy 2.4605 etc.

Transmitter PIOX® TS	
Ambient temperature:	-10°C ... 60°C
Power supply:	(100 ... 240) VAC (18 ... 36) VDC
Display:	2 x 16 characters, dot matrix, backlit
Power consumption:	< 15 W
Operating languages:	Czech, Danish, Dutch, English, French, German, Norwegian, Polish, Spanish
Type TS374 (field housing)	
- Weight:	approx. 2,8 kg
- Deg. of protection:	IP65 acc. to EN60529
- Material:	Aluminum, powder coated
- Dimensions:	(280 x 200 x 70) mm (W x H x D)
- Channels:	2
Type TS379 (insert for 19“ rack)	
- Weight:	approx. 1,7 kg
- Deg. of protection:	IP20 acc. to EN60529
- Material:	Aluminum
- Dimensions:	(213 x 129 x 170) mm (42 DU x 3 HU) (without back panel)
- Channels:	2

Software	
Operating system:	All Windows™ versions
Function:	Modelization and administration of the characteristic curves, upload and download to and from the transmitter

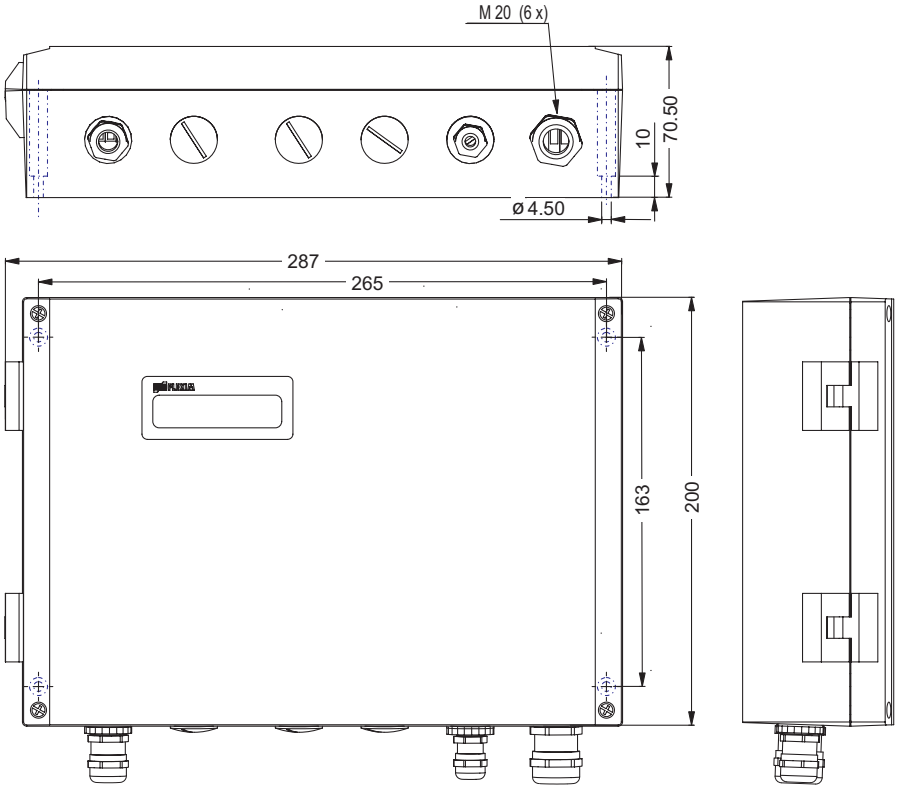
Communication	
Interface:	RS232, RS485 optional
Data:	actual reading, logged readings, parameter sets

Data logger	
Loggable values:	all measured quantities
Capacity:	>100000 meas. values

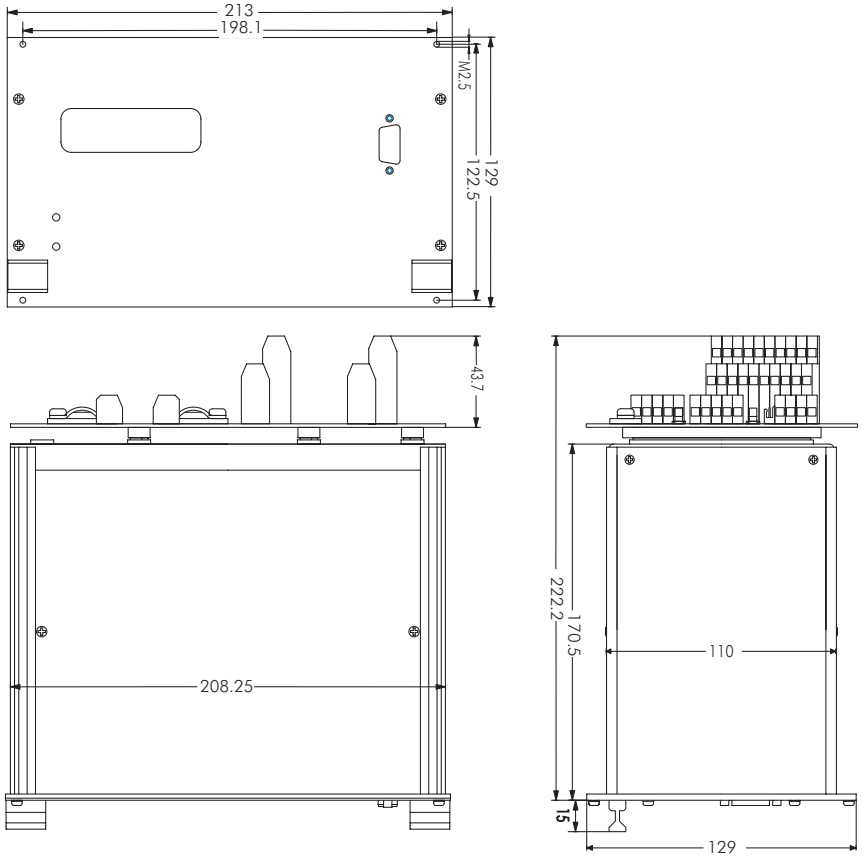
Outputs (optional)	
- The outputs are galvanically isolated from the main device.	
- The number of outputs that can be installed depends on the output type. Consult FLEXIM for more information.	
Current	
- Range:	(0/4 ... 20) mA
- Accuracy:	0.1% of read. ± 15 µA
- active output:	R_{ext} < 500 Ω
- passive output:	U_{ext} < 24 V, R_{ext} < 1 kΩ
Voltage	
- Range:	(0 ... 1) V or (0 ... 10) V
- Accuracy:	0 ... 1 V: 0.1% of read. ± 1 mV 0 ... 10 V: 0.1% of read. ± 10 mV
- Intr. resistance:	R_i = 500 Ω
Frequency	
- Type:	Open collector, 24 V/4 mA
- Range:	0 ... 1 kHz or 0 ... 10 kHz
Binary	
- Open collector:	24 V/4 mA
- Reed relay:	48 V/0.1 A
- Function:	limit

Inputs (optional)	
- The inputs are galvanically isolated from the main device.	
- A maximum of 4 inputs can be installed.	
Temperature	
- Type:	Pt100 four-wire circuit
- Range:	-50 °C ... 400 °C
- Resolution:	0.001 K
- Accuracy:	± (0.05 K)
Current	
- Range:	active: (0 ... 20) mA passive: (-20 ... 20) mA
- Accuracy:	0.1% of read. ± 10 µA
- Intr. resistance:	R_i= 50 Ω
Voltage	
- Range:	(0 ... 1) V or (0 ... 10) V
- Accuracy:	0 ... 1 V: 0.1% of read. ± 1 mV 0 ... 10 V: 0.1% of read. ± 10 mV
- Intr. resistance:	R_i= 1 MΩ

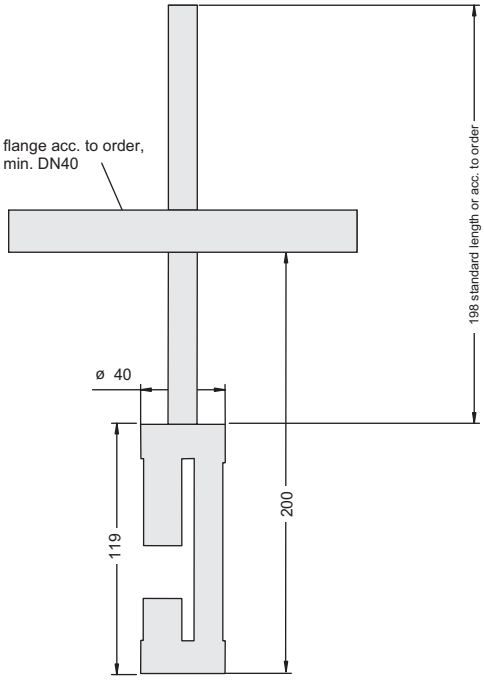
Dimensions of the Transmitter TS374 (in mm)

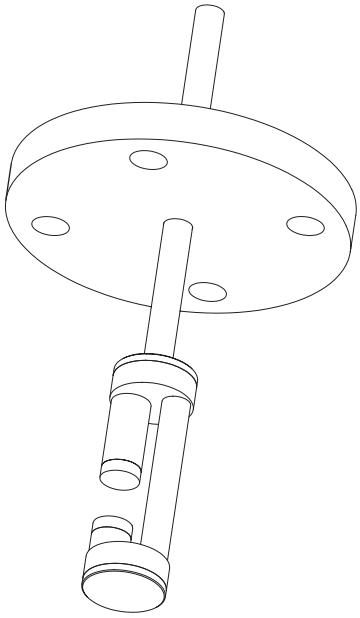


Dimensions of the Transmitter TS379 (in mm)

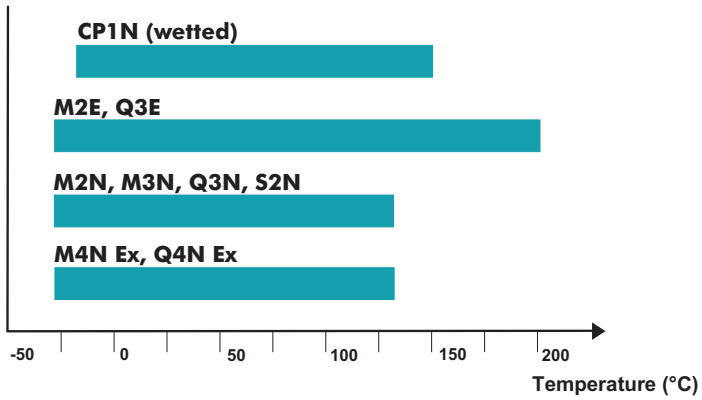


Dimensions of the Wetted Sensor CP1N (here with flange) (in mm)

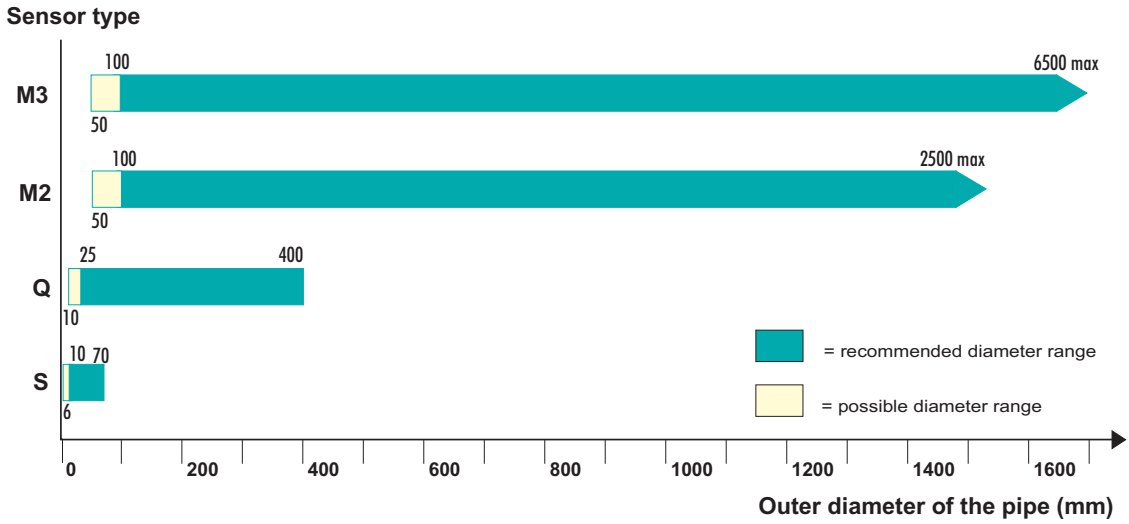




Temperature Range of the Transducers



Diameter Range of the Clamp-On Transducers



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