KTM

KTM SCALARIS
DENSITY TRANSDUCERS

LIQUIDS DENSITY
AND TEMPERATURE MEASUREMENT

KTM SCALARIS

KTM SCALARIS In-line Density Meter

PURPOSE:

Liquids density and temperature measurement with capability to indicate mass flow rate, mass, volumetric flow rate and volume.

ADVANTAGES:

- **Metrologically supported** measurement of medium parameters with a density of up to **2000 kg/m³** with the feature of temperature and pressure **compensation**;
- Medium flow rate measurement channel with an error of **±1%**;
- Option of primary and/or periodic verification of the density measurement channel only (if so desired by a customer);
- The maximum temperature of the measured medium - up to **+400°C.**;
- The maximum pressure of the measured medium - up to **30 MPa**;
- In-service life of **20 years**.

DENSITY METERS WITH NOMINAL DIAMETERS OF 25, 50 MM
ARE MANUFACTURED AT IN-HOUSE FULL-CYCLE
PRODUCTION FACILITY

patents
10
and inventions

DN25

DN50

Density Meters
from DN25
to DN50
and series-produced

PETROLEUM PRODUCT QUALITY CONTROL AT SHIPMENT TO A CUSTOMER

High accuracy of the density measurement by KTM SCALARIS up to ± 0.2 kg/m³ enables quality control of the operating medium during fiscal metering.
The built-in density correction function for changes in temperature and pressure enables to maintain accuracy during changes in the processing procedure parameters.

Reference point
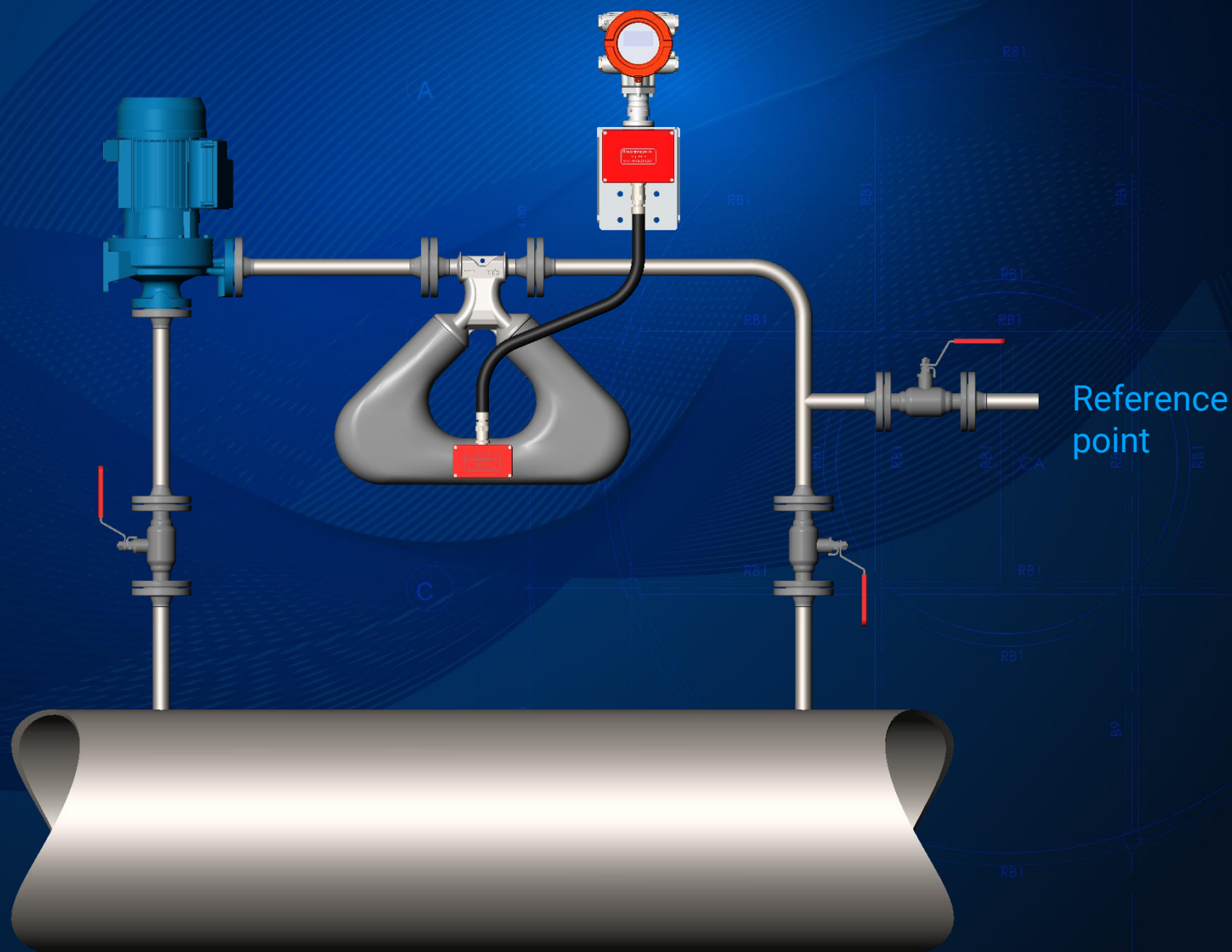
MIXING CONTROL

A wide range of output interfaces enables to integrate the KTM SCALARIS density transducer into the mixing system in order to control the finished mixture quality.

Concentrate

Control system

Water

Final mixture
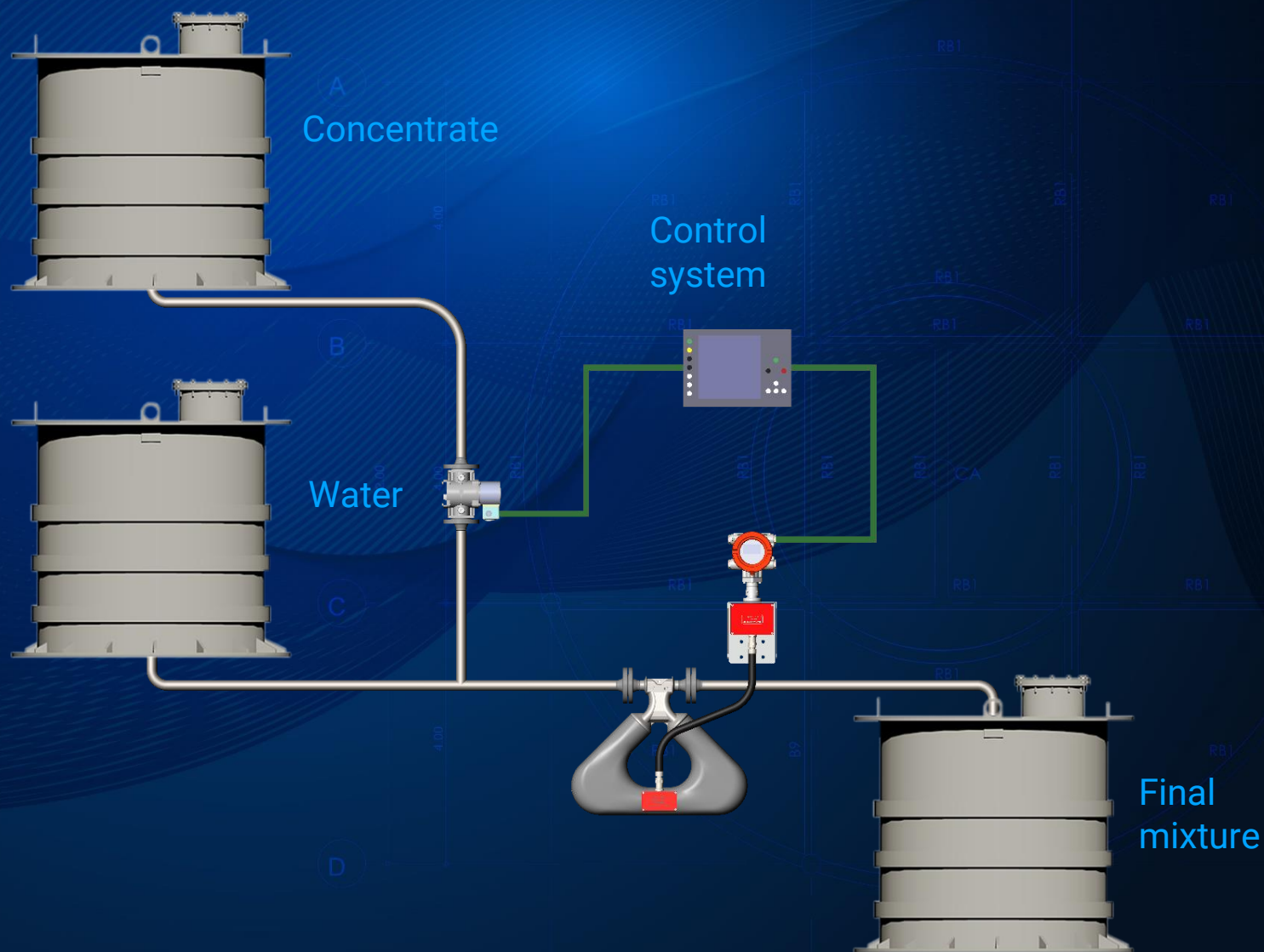
HIGH TEMPERATURE DESIGN OPTION UP TO **+350°C/+400°C** OPERATING PRESSURE UP TO **30 MPA**

Measuring the operating medium density with a temperature up to +350 °C/**+400°C** enables to use KTM SCALARIS in various industries:

- For measuring the density of high-temperature media such as tar, bitumen;

- For measuring liquid density during hydrogen cracking;

- For pipelines with regular steam purging.

BUILT-IN TEMPERATURE DENSITY CORRECTION FUNCTION

Dynamic compensation of density readings depending on **temperature** (built-in thermal temperature-sensing element) enables to maintain the device accuracy when the operating medium temperature changes.
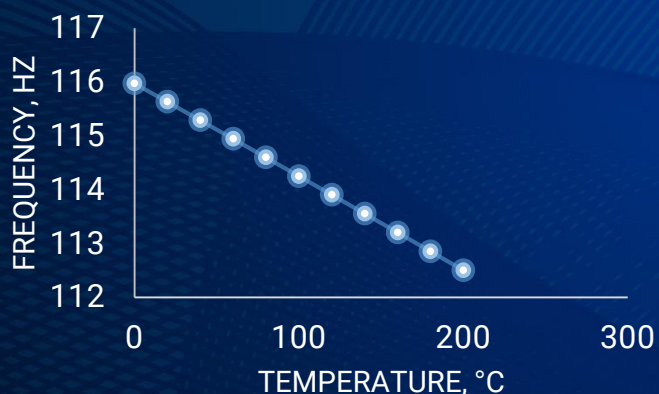
$$A = \frac{Q \cdot \delta_1 \cdot n}{100}$$

where Q is the current flow rate in the pipeline;

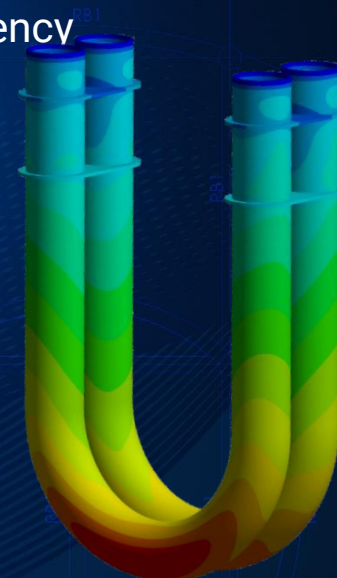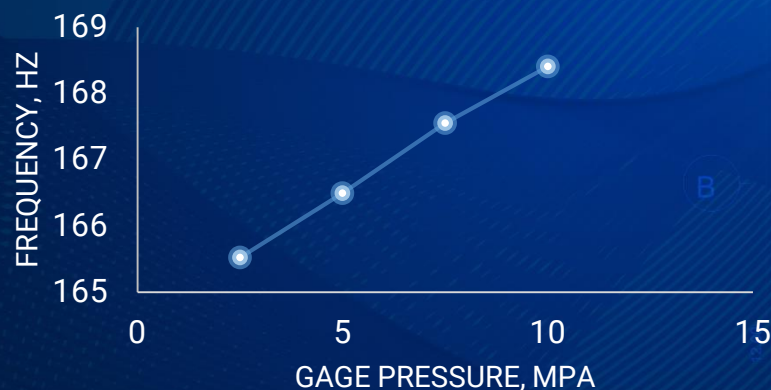δ_1 - Additional error without temperature compensation (±0.3 kg/m³ per every 10 °C);

n = 24·365 = 8760 − The number of hours per year.

Temperature	Absolute error without temperature compensation	Nominal density	Density without temperature compensation	Calculated mass flow rate at the volumetric flow rate of 100 m³/h without temperature compensation	Absolute error of the mass flow rate without temperature compensation	Accumulated error over a year of use without temperature compensation
+20 °C (laboratory environment)	±0.2 kg/m³	850 kg/m³	850 kg/m³	85,000 kg/hour	±540 kg/hour	4,730 tons
+200 °C	±5.6 kg/m³		855.4 kg/m³	85,540 kg/hour		

BUILT-IN PRESSURE DENSITY CORRECTION FUNCTION

Excessive pressure leads to the change in the oscillating system rigidity and the oscillation frequency shift and, as a result, the measured density shift. The correction function enables to maintain the device accuracy when operating medium pressure changes.

Pressure	Absolute error without pressure compensation	Nominal density	Density without pressure compensation	Calculated mass flow rate at the volumetric flow rate of 100 m³/h without pressure compensation	Absolute error without pressure compensation	Accumulated error over a year of use without pressure compensation
0.1 MPa (laboratory environment)	±0.2 kg/m³	850 kg/m³	850 kg/m³	85,000 kg/hour	±47 kg/hour	411 tons
10 MPa	±0.47 kg/m³		850.47 kg/m³	85,047 kg/hour		

$$A = \frac{Q \cdot \delta_1 \cdot n}{100}$$

where Q is the current flow rate in the pipeline;

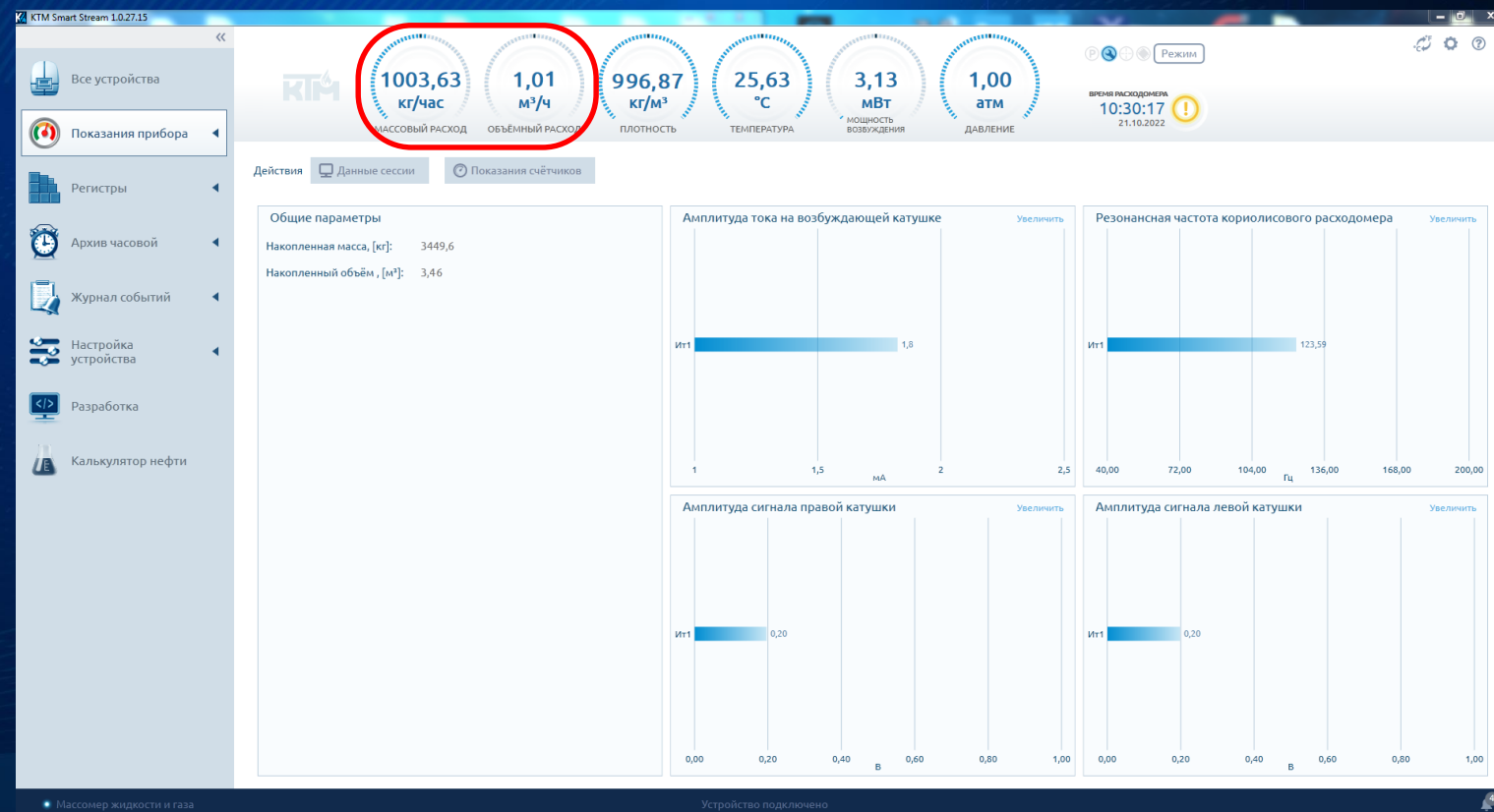δ_1 - Additional error without pressure compensation (± 0.047 kg/m³ per every 1 MPa);

n =24·365=8760 − The number of hours per year.

MEDIUM FLOW RATE MEASUREMENT CHANNEL WITH AN ERROR OF ±1%;

At a customer's request, it is possible to manufacture KTM SCALARIS density meter with a flow rate indication function for monitoring the operating medium sampling.

THANK YOU FOR YOUR ATTENTION!

"NPP KuibyshevTelecom-Metrologiya" LLC
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settlement

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