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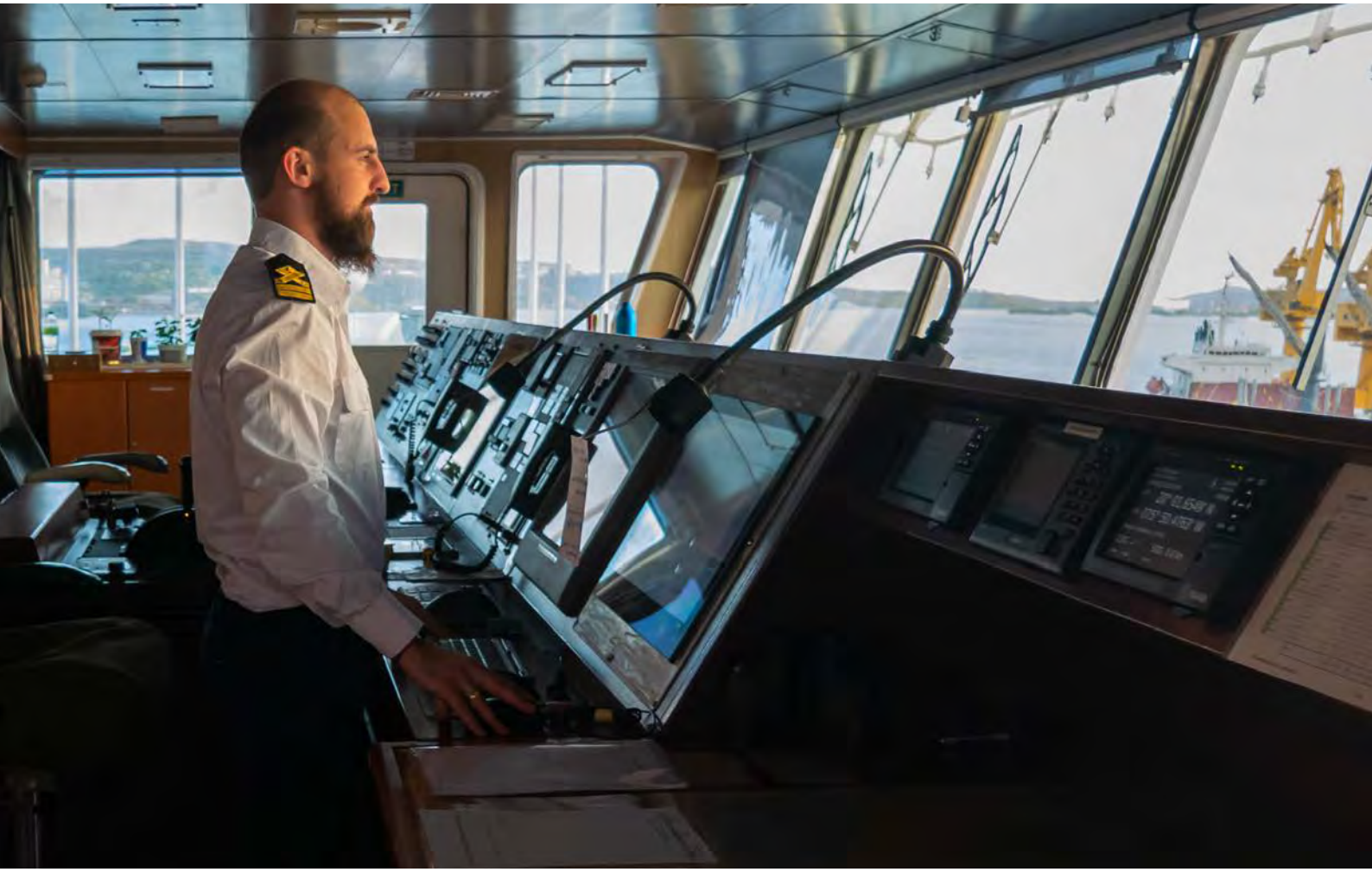

Marine -
Flow measurement solutions

TRICOR Coriolis

TRICOR Coriolis Marine - Flow measurement solutions

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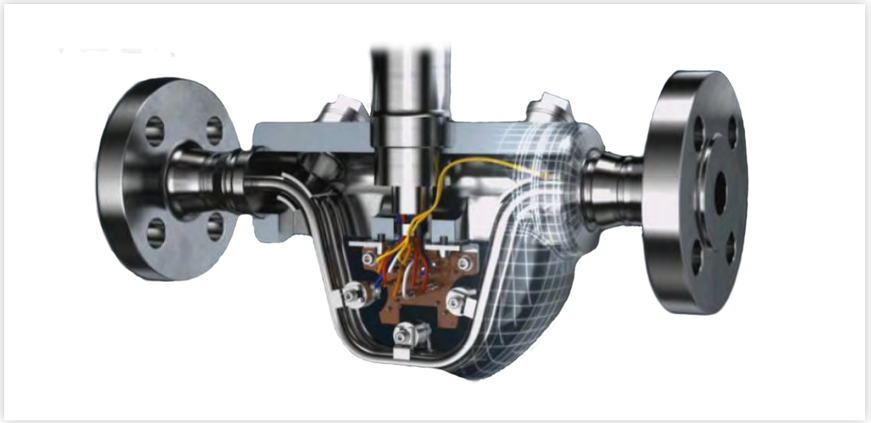
Many years of experience and expertise in the area of automation technology and instrumentation makes us the ideal partner for flow measurement technology in the maritime industry. We offer you field tested and proven solutions, that meet rules and regulations - and help you save money. The ability to accurately measure fuel consumption based on mass flow is becoming key for ship owners and operators in a field, where fuel consumption contributes most to the total costs. Accurate mass flow measurement with a TRICOR Coriolis Mass Flow Meter helps ship owners, operators and charterers to better control costs, decrease fuel consumption and as a consequence increase competitiveness of your fleet. With industry leading density measurement and competitive pricing you should get the quickest possible return on investment.

How can you reduce the running costs of the vessels you operate? In our opinion there are 4 steps to improve your vessel performance.

The advantage of the four step approach is the fact that you can decide, depending on budgets, when and whether you implement each of the four steps: Measure, Monitor, Analyze, and Optimize. Only with accurate flow information about your fuel consumption and with versatile monitoring systems you are able to conclude actions for sustainable optimization of your vessel performance and thus to save money.



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MEASURE

The Coriolis Flow Meter measures mass instead of volume compare to PD Meter (positive displacement), which makes measurement independent from density of fuel.

The Mass Flow Meter makes use of the Coriolis force. This describes the deflection of a moving body in a rotating system caused by its own inertia. It is proportional to its mass, velocity and angular velocity.

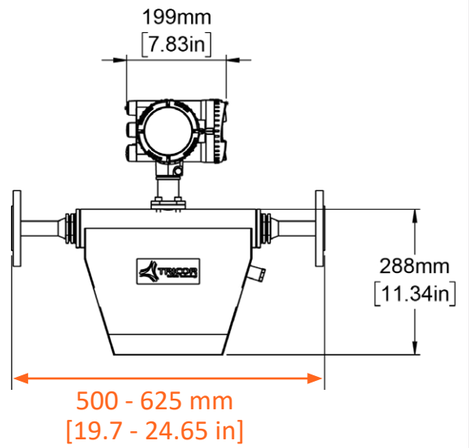
The Mass Flow Meter consists of oscillating tubes through which the measured medium flows. Due to the Coriolis force, the tubes are deflected differently at the inlet and outlet sides. This results in a measurable phase shift that is proportional to the amount of flow.

High-precision measurements of mass flow, density and temperature of both liquid and gaseous media can be performed simultaneously. TRICOR Coriolis Mass Flow Meters are unaffected by changing fluid properties such as temperature or pressure, as well as other external environmental influences, making it the ideal choice for marine fuel systems.

TRICOR Coriolis product family

BENEFITS OF CORIOLIS MASS FLOW METERS

- Customized installation length
- Direct mass flow measurement
- Real time density measurement for fuel quality control (Density Range: up to 1000 kg/m³)
- Maintenance free and no moving parts
- More accurate than volume based flow meters as Coriolis does not have any abrasion.
- Excellent repeatability in order to determine actions for process/ engine optimization
- Available flange connection: DIN, JIS, ASME and Thread
- Calibration according DIN EN ISO/IEC 17025:2005 for various oils, traceable to national and international standards



Customized flange-to-flange dimensions:
TRICOR Coriolis Mass Flow Meter TCM 028K

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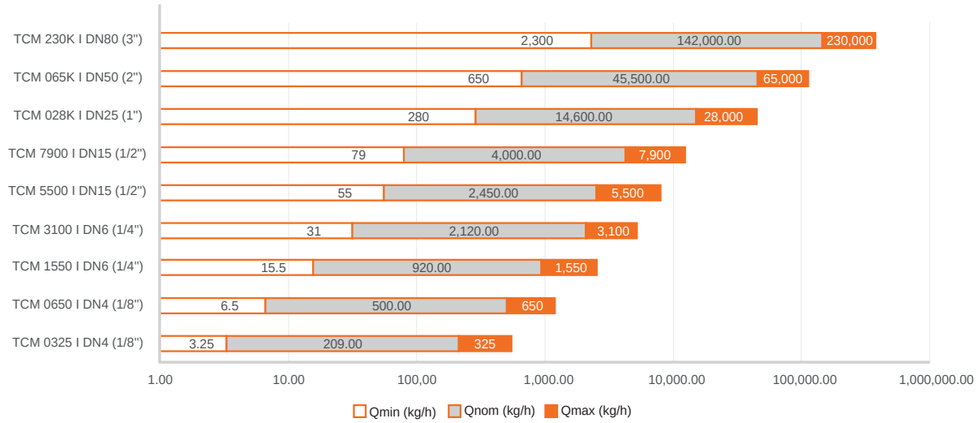
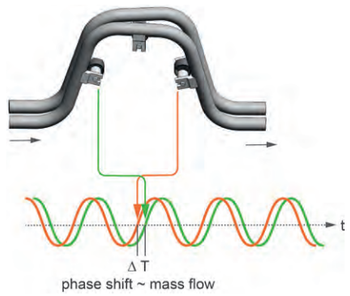
TRICOR Coriolis CLASSIC Series

	TCM 0325	TCM 0650	TCM 1550	TCM 3100	TCM 5500	TCM 7900	TCM 028K	TCM 065K	TCM 230K
Rated Size	DN4 (1/8”)	DN4 (1/8”)	DN6 (1/4”)	DN6 (1/4”)	DN15 (1/2”)	DN15 (1/2”)	DN25 (1”)	DN50 (2”)	DN80 (3”)
Max. Flow Rate	325 kg/h [12 lb/min]	650 kg/h [24 lb/min]	1,550 kg/h [57 lb/min]	3,100 kg/h [114 lb/min]	5,500 kg/h [202 lb/min]	7,900 kg/h [290 lb/min]	28,000 kg/h [1,029 lb/min]	65,000 kg/h [2,388 lb/min]	230,000 kg/h [8,450 lb/min]
Nom. Flow Rate	209 kg/h [10 lb/min]	500 kg/h [20 lb/min]	920 kg/h [35 lb/min]	2,120 kg/h [75 lb/min]	2,450 kg/h [90 lb/min]	4,000 kg/h [145 lb/min]	14,600 kg/h [535 lb/min]	45,500 kg/h [1,670 lb/min]	142,000 kg/h [5,220 lb/min]
Basic Accuracy (Mass Flow)	±0.3 % of flow rate (option: up to 0.1 % of flow rate)								±0.3 % (option: ±0.15 %)
Basic Accuracy (Volume Flow)	±0.3 % of flow rate (option: up to 0.15 % of flow rate)								±0.3 % (option: ±0.2 %)
Process Temperature Range	-40 °C ... +100 °C [-40 °F ... +212 °F] (standard) -40 °C ... +150 °C [-40 °F ... +302 °F] (option) -60 °C ... +200 °C [-76 °F ... +392 °F] (option)								
Weight Compact Version	7 kg [15.4 lb]	7 kg [15.4 lb]	11.6 kg [25.6 lb]	11.6 kg [25.6 lb]	8.5 kg [18.7 lb]	8.5 kg [18.7 lb]	13.1 kg [28.9 lb]	35.2 kg [77.6 lb]	87 kg [191.8 lb]
Repeatability	±0.05 % of flow rate								
Max. Pressure standard	200 bar [2.900 psi] Option: up to 345 bar [5.00 psi] (not for ASME)					100 bar [1.450 psi]			

CORIOLIS FLOW RANGE





CORIOLIS MEASUREMENT PRINCIPLE

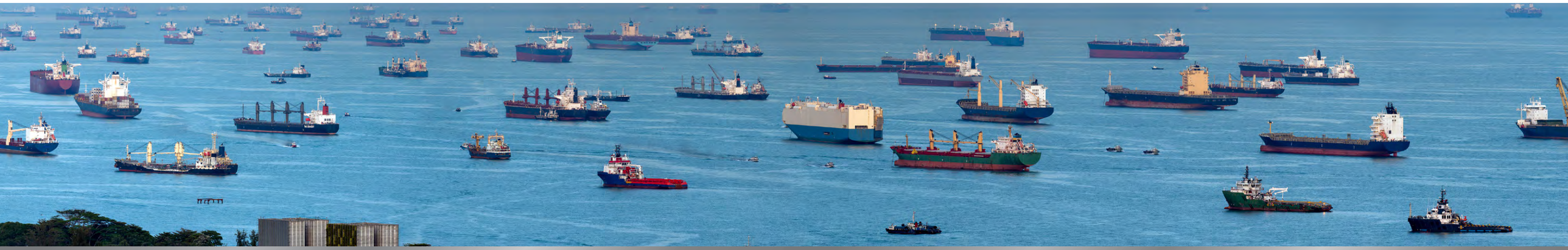
MASS FLOW

Time shift between Sensor A and Sensor B is directly proportional to the Mass Flow Rate.

Tricor Coriolis flow meter phase Shift is @ 40 µs and does reflect a excellent mechanical design.

DENSITY MEASUREMENT

Density Measurement is due to natural frequency of the tube vibration.



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THESE FUELS ARE MEASURED BY OUR TRICOR CORIOLIS MASS FLOW METERS

LNG/LPG

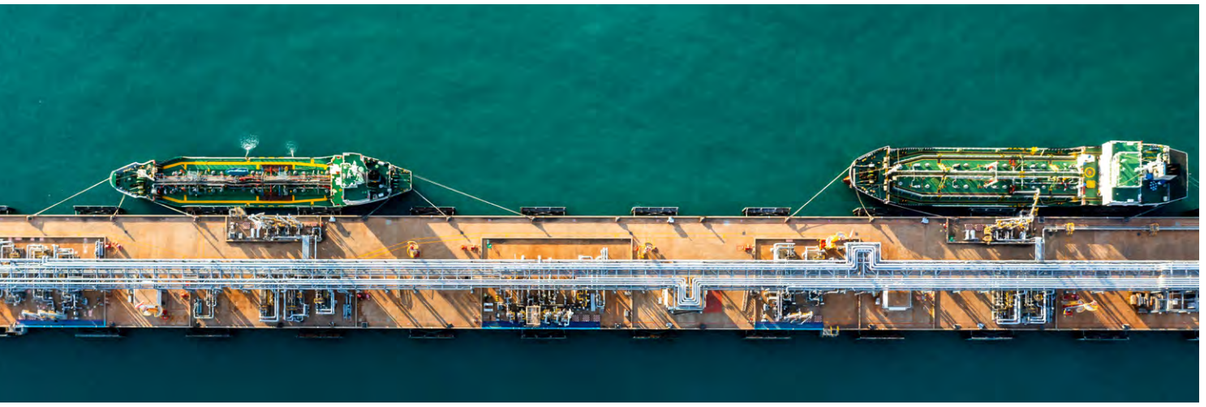
AMMONIA

METHANOL

BIOFUEL

SYNTHETIC FUEL

MDO, MGO, DO, HFO



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TCE 8000/8100 CORIOLIS TRANSMITTER

Features

- Easy interface & factory pre-configured
- Programmable control inputs and outputs
- Approvals for use in hazardous areas
- RS485 (Modbus RTU) and USB interface

Benefits

- Works out of the box, reduce installation cost
- Transmits flow rate, total, density or temperature
- Certified for use in nearly all plant environments

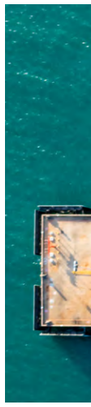
TCE 6000 CORIOLIS TRANSMITTER

Features

- Programmable control inputs
- Ready for ESTA applications
- RS485 (Modbus RTU) and USB interface

Benefits

- Transmits flow rate, total, density or temperature
- Economy version
- Simple meter configuration
- Easy interfacing with TRICOR configuration tool



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OPTIMIZE MARINE VESSEL FUEL CONSUMPTION

Pemex (Mexican state-owned petroleum company) contracted Marinsa de Mexico, a marine services company, to build a Platform Supply Vessel to transport materials and supplies to/from oil platforms. Pemex specified a fuel monitoring system for the offshore vessel to accurately track and report fuel usage.

The fuel monitoring system incorporated Coriolis TRICOR Mass Flow Meters to ensure the highest fuel measurement accuracy and most reliable/repeatable feedback. Unlike volume, the mass of a fluid is unaffected by changes in temperature and pressure. Thus, the TRICOR Coriolis Mass Flow Meters used for measuring mass flow is ideal for providing flow measurement outputs. Three models of TRICOR Coriolis Mass (TCM) Flow Meters measure the flow of diesel at different points along the fuel line depending on flow rates, pressures, and line sizes.

CORIOLIS MEASUREMENT AND PERFORMANCE MONITORING IN REAL TIME

The NSB Group has developed tools for real-time data collection to improve the measurement of fuel consumption. This allows accurate evaluation of the information and transparency for the customer.

For this, NSB uses the TRICOR Coriolis mass flow meter (TCM) from KEM, to improve the accuracy of the fuel measurement. These meters allow a direct mass balance of consumption and can provide sustainably assessable data through high accuracy and repeatability. This provides NSB with an above average ability to meet the transparency requirements to the cost structure of the vessels combined with the accuracy of the fuel billing. When challenges arise in the implementation process, the NSB Group can always fall back on the active and rapid support of KEM.

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