

Safety on the Water, and Underwater

There's lots to be measured and controlled on a ship. Many moving components are monitored with angle-of-rotation transducers, which reliably convert displacement into measurement signals. Despite difficult ambient conditions such as vibration, very low and very high temperatures, high humidity and oil saturated atmospheres, the KINAX WT707 is right at home and has no trouble coping with a wide variety of applications. We'll mention just a few:

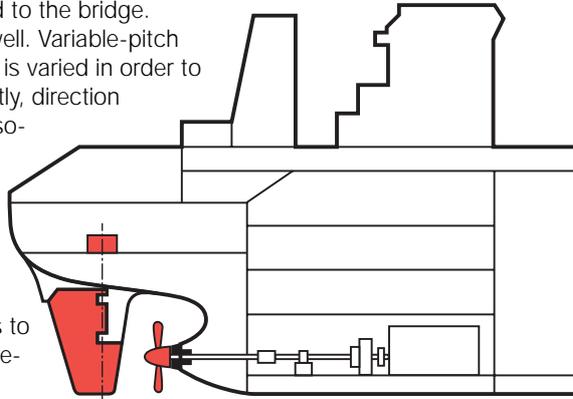
Full steam ahead!

The diesel engine is at the heart of most modern ships. Fuel feed rates must be accurately controlled in order to assure reliable functioning. In order to be able to read the engine's load status on the bridge, a measuring transducer is mounted to the throttle linkage.



Set your bearings for the right destination!

A KINAX measuring transducer is used at the rudder as well. Its angular position is measured and forwarded to the bridge. Propulsive force is of course important as well. Variable-pitch screws are used to control this factor. Pitch is varied in order to control forward thrust and, just as importantly, direction of travel. Pitch can also be adjusted at the so-called thrusters, which are used more and more frequently in the bow. Blade position at the screw and the thruster is measured with angular position transducers in order to assure accurate control. Due to the fact that great forces are brought to bear upon the screw which thus applies extreme loads to the drive shaft, a rugged solution must be selected for this measuring task: the KINAX WT707. It's mounted inside the shaft tunnel.



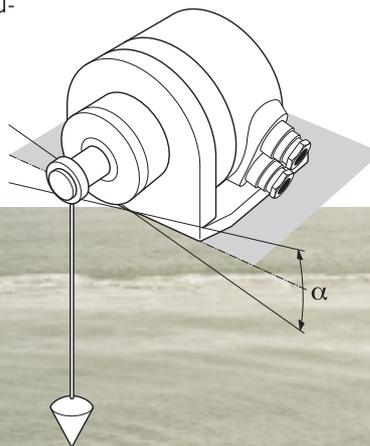
Submarines are especially dependent upon orientation aides.

Angular position transducers are not only used in commercial shipping, but rather in military applications as well. For example, various rudders are utilized in submarines to assure good maneuverability (diving, surfacing and course settings). Positioning of these rudders is measured with angular position transducers as well, assuring safe travel and accurate surfacing.

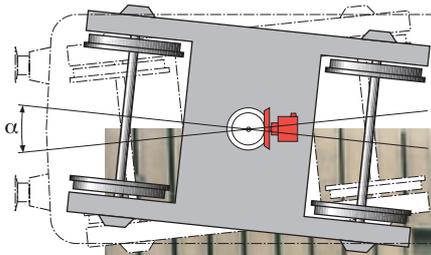


KINAX is capable of measuring list as well.

The fact that a ship must be properly loaded has been proven by numerous accidents at sea in the past. The ship should sit level on the water. The ship's list must be measured to this end, which is accomplished by means of an angle-of-rotation transducer. A weight is suspended from the transducer's shaft which always hangs perpendicular to the surface of the water. If the ship leans to one side or the other, the shaft is rotated and a measurement signal is generated providing a value for list. This signal can be read out in order to load the ship in a balanced fashion (trim). Measurement is performed from bow to stern, as well as from the starboard to the port side.



Safety on the Railways, in Power Plants and in Industrial Facilities



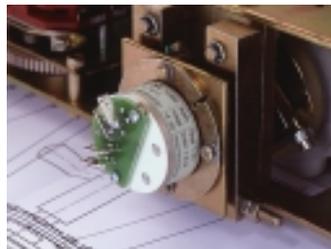
Generating Power with the Wind

Wind-driven generators are utilized more and more frequently to convert wind power into electricity. In this application as well, rotor position is measured with a KINAX WT 707 angular position transducer installed way up in the gondola, and is adjusted according to prevailing wind conditions. The KINAX is insensitive to cold, heat and humidity.

Silencing the Squeaky Wheel

Everyone is familiar with the squeaking associated with trams, subways and trains when they enter a curve. The subway system in Brussels has solved the problem. La Société des Transport Intercommunaux Bruxellois (S.T.I.B.) has been using a curve lubricating system since 1996 which works as follows: A KINAX WT707 angular position transducer is mounted to the shaft of the train's bogie frame. When the bogie frame rotates relative to the car as the train enters a curve, the shaft at the angular position transducer is rotated as well. The output signal is changed and lubrication is triggered by the controls with the help of a relay. The right inside rail is lubricated in a right-hand curve, and the left inside rail in a left-hand curve.

At speeds of up to 72 km per hour, the measuring system, and above all the sensing element, must react very quickly. Even long curves extending over a distance of 500 m are reliably recognized at relatively high speeds, and are traversed without any unpleasant squeaking. Additional benefit: reduced wear and tear at the rails.



Thousands of tons are entrusted to 0.001 Ncm!

Torque at the KINAX 3W2 angle-of-rotation transducer is less than 0.001 Ncm. Passenger and freight trains weighing thousands of tons are controlled with this minute force. The angle-of-rotation transducer is at the heart of the controls, which, amongst other products, is manufactured and successfully marketed all over the world by Spring in Wettingen, Switzerland. The timing gear in a standard locomotive is mechanically coupled to the position transducer. Its output signal is fed to the controls in order

to assure travel at the desired speed. Angle-of-rotation transducers are integrated into the three levers used to control a modern locomotive: one lever for applying and releasing the brakes, one for forward or reverse travel and one for speed control. Mechanical position is detected by the KINAX 3W2 angle-of-rotation transducer, and is converted into an electrical signal for the controls. In this application as well, the angle-of-rotation transducer is used primarily because of its exceptional reliability.

Everything under control!!

When a fuel depot burns, it really burns! For this reason, at least one fire extinguishing jet is permanently installed in every fuel depot, whose extinguishing direction must be measured and acknowledged. Extinguishing jets of this type are manufactured in the USA. Originally, the concept made use of integrated potentiometer pick-ups. Unreliable operation has made it necessary to retrofit all installations with the KINAX 3W2 angle-of-rotation transducer. The fact that extinguishing jets are subjected to enormous forces becomes apparent to anyone who attempts to hold a fire hose during operation. However, extinguishing jets are capable of much greater throughput rates. Durability and reliability are a must for this reason. The 3 measuring transducers are used to position all three axes (X, Y and Z).



KINAX Angular Position Transducers: Safety Everywhere

- Proven, contactless, capacitive sensing system
Your advantage: wear-free, low maintenance
- Analog measuring process: practically infinite resolution
- Measuring ranges from 0 ... 5° to 0 ... 270° (even more with gearbox). Your advantage: large range of possible applications, any angle can be measured
- Minimal torque (< 0.001 Ncm with 2 mm shaft)
Your advantage: The shaft can be rotated in an almost non-reactive fashion and does not function as a "brake" for attached devices.
- Smallest compact design variant has a diameter of only 48 mm
Your advantage: can be installed anywhere (OEM)
- Rugged design with IP 67 protection
Your advantage: can be used under difficult ambient conditions
- DC-mA signal available at the output
Your advantage: Direct connection to an SPC, SCADA or a process control system is possible.
- Adjustable zero point and range
Your advantage: can be adapted to measuring apparatus on-site
- Available in explosion-proof version: intrinsic safety per EEx ia IIC T6
Your advantage: can be used in potentially explosive atmospheres

Version	 KINAX 3W2 OEM	 KINAX WT 710 Attachment device	 KINAX WT 707 Machine Manufacturing	 KINAX SR 709 Position
Measuring range [° or mm]	0 ... 5 to 0 ... 270	0 ... 5 to 0 ... 270	0 ... 5 to 0 ... 270	0 ... 10 to 0 ... 140 mm
EEx ia T5/T6 IIC (optional)	•	•	•	•
Output signal [mA]	0 ... 1 to 0/4 ... 20	0 ... 1 to 0/4 ... 20	0 ... 1 to 0/4 ... 20	0 ... 1 to 0/4 ... 20
Auxiliary DC power [V]	12 ... 33 (12 ... 30 Ex)	12 ... 33 (12 ... 30 Ex)	12 ... 33 (12 ... 30 Ex)	12 ... 33 (12 ... 30 Ex)
DC-AC auxiliary power (opt.) [V]	—	24 ... 60/85 ... 230	24 ... 60/85 ... 230	24 ... 60/85 ... 230
Accuracy [%]	0,5 / 1,5*	0,5 / 1,5*	0,5 / 1,5*	0,5
Friction torque [Ncm]	< 0,001 or < 0,03**	< 0,001 or < 0,03**	25	—
Drive shaft dia. [mm]	2 or 6 or 1/4"	2 or 6 or 1/4"	19	—
Housing dia. [mm]	48	80	102	105
Housing protection IP	50	43	67	54
Allowable static load on the shaft, radial [N]	16 or 83**	16 or 83**	1000	—
Allowable static load on the shaft, axial [N]	25 or 130**	25 or 130**	500	—
GL certificate	•	—	•	—
Allowable vibration 0 ... 200 Hz [g]	5	5	10	5
Allowable impact [g]	50	50	50	50

* With measuring ranges < 150°, accuracy: 0.5%

** 2 or 6 mm shaft diameter

The examples described above are just a few of the possible applications for KINAX transducers.

The possibilities are almost unlimited.

We would be pleased to hear from you about your application.

We can provide you with a suitable proposal with a quick, non-binding quotation.

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