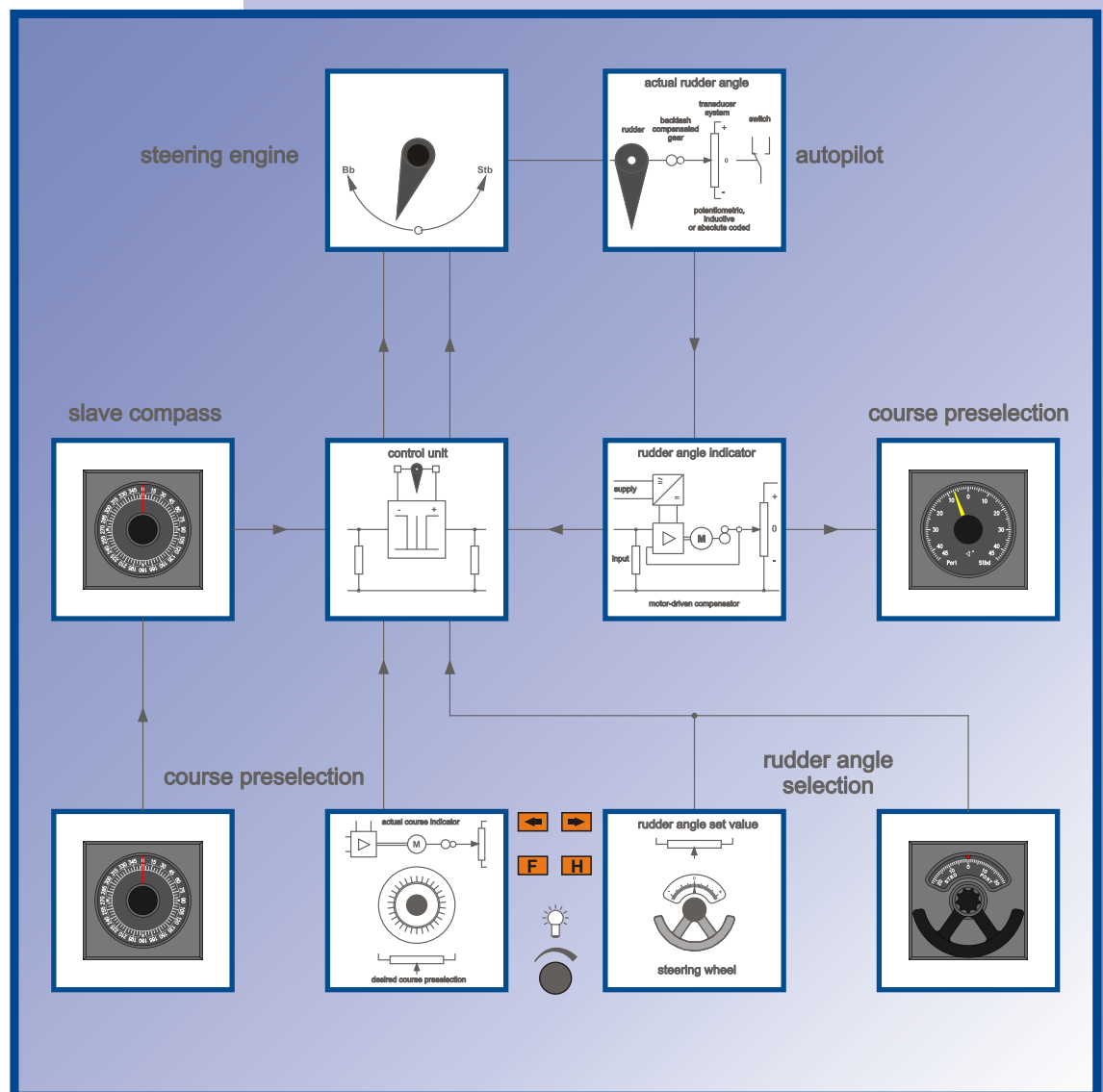


# Systems of measurement for ships and offshore facilities



# Demonstration panel

**Systems of measurement for ships and offshore facilities**  
**application example "Steering gear"**

This panel demonstrates the simulation of a manual control and an automatic control of the steering gear of ships. Control systems of that type are considered standard for the modern conduct of a ship today, for which the product spectrum of FSG provides a multitude of associated transmitters, indicators and input devices. To it belong amongst other things

- **Angle transducers for the determination of the position of a rudder or propeller**
- **Tilt angle transmitters for measuring and monitoring the heeling angle for lading purposes on cargo ships**
- **associated console indicators for the display of rudder or heeling angle and indicators for the display of operating states, like pressure, temperature, velocity etc.**
- **Set-point adjusters as control board devices for preselection of rudder angle, course or travelling speed**
- **Signal converters, limit indicators, three-step controllers and PID controllers.**

The panel shows components of a rudder and course control.

The rudder control comprises the autopilot, rudder angle selection, rudder angle indicator and the control unit for controlling the steering engine.

## ... Actual value determination

For the determination of the actual rudder angle either a potentiometric, inductive or absolute coded transducer is used, which is - for protection against mechanical damage and the effects of dust and moisture - incorporated in a robust aluminium case degree of protection IP 65 to IP 68.

For adapting the angle of the steering engine to the transducer angle, the autopilot contains a built-in attachable gear, backlash compensated.

For end-point limitation, there is an additional option to build in break-before-make cam-operated switches.

## ... Set-point adjustment

The rudder angle set value is preselected by means of the rudder angle selector, which is available as console device, flush-type format 96 mm x 96 mm and 144 mm x 144 mm.

The set-point is preselected on a linear graduated illuminated disk by means of a hand wheel. The hand wheel contains a spring pullback mechanism to mid-scale position or to a preselectable scale mark.

The built-in potentiometric, inductive or absolute coded angular position transmitters provide at the output either an analogue or a digital set-point signal.

## ... Measured value indication

The actual rudder angle is displayed by means of the rudder angle indicator, which is also available as console device, flush-type format 96 mm x 96 mm and 144 mm x 144 mm.

The actual position is indicated by a pointer on a linear graduated illuminated disk. Scale angle, graduation of the scale and scale labelling are optional according to customer requirements.

In most cases, a motor-driven potentiometer in a compensating circuit is used as measuring system, capable of processing input signals in form of a resistance, voltage or current variation.

For simple applications e.g. inland navigation purposes, indication of rudder angle is often carried out by means of a favourably priced rotary magnet system. In this case the rudder angle is picked-up by a threefold tapped potentiometer and displayed on an indicating instrument by means of a rotary magnet system. The system represents an electrically simulated shaft and is appropriate in the best possible manner for measured value indication exceeding 360° of a variable-pitch propeller.

## ... Steering control

For controlling the steering engine in the simplest case, a three-step controller can be used, which makes a comparison between analogue actual value and set point and takes over the control of the steering engine via the output contacts according to the direction of deviation.

## ... Course control

For course-control, the FSG product program comprises only the course selector and the slave compass.

The real controller to carry out course control is in most cases part of the steering gear and therefore not available within the FSG product program.

Both instruments are available as console devices, flush-type format 96 mm x 96 mm and 144 mm x 144 mm.

The slave compass contains a motor-driven compensator, which pictures the signal of a master gyrocompass rotatable without stops over 360°, for instance 0 - 20 mA, on a graduated disk.

Scale labelling, graduation of the scale and dial illumination in this case as well are optional according to the type of measured value indication.

Course setting is carried out by means of a rotary type control knob on an illuminated disk with a linear graduation over 360°. The output provides the set-point signal either analogue, for instance 0 - 20 mA, or digital.

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