

# AHD TCS-A

## Trim Tabs Control System



- **Patent-registered electro-hydraulic trim tabs control**
- **Easily operated system for manual and automatic control**
- **Calibration and monitoring of trim tab position via system electronics**
- **System operates without displacement transducer for hydraulic cylinders; the electrical wiring in the exterior of the vessel can be completely eliminated**
- **Integration of the system in the ship alarm system with visualization on color displays**

## Trim tabs control and monitoring with manual and automatic mode

The electro-hydraulic trim tabs control, developed and patented by Böning Automationstechnologie GmbH, is designed for operation in fast yachts whose cruising performance is significantly affected by the control of the trim tabs.

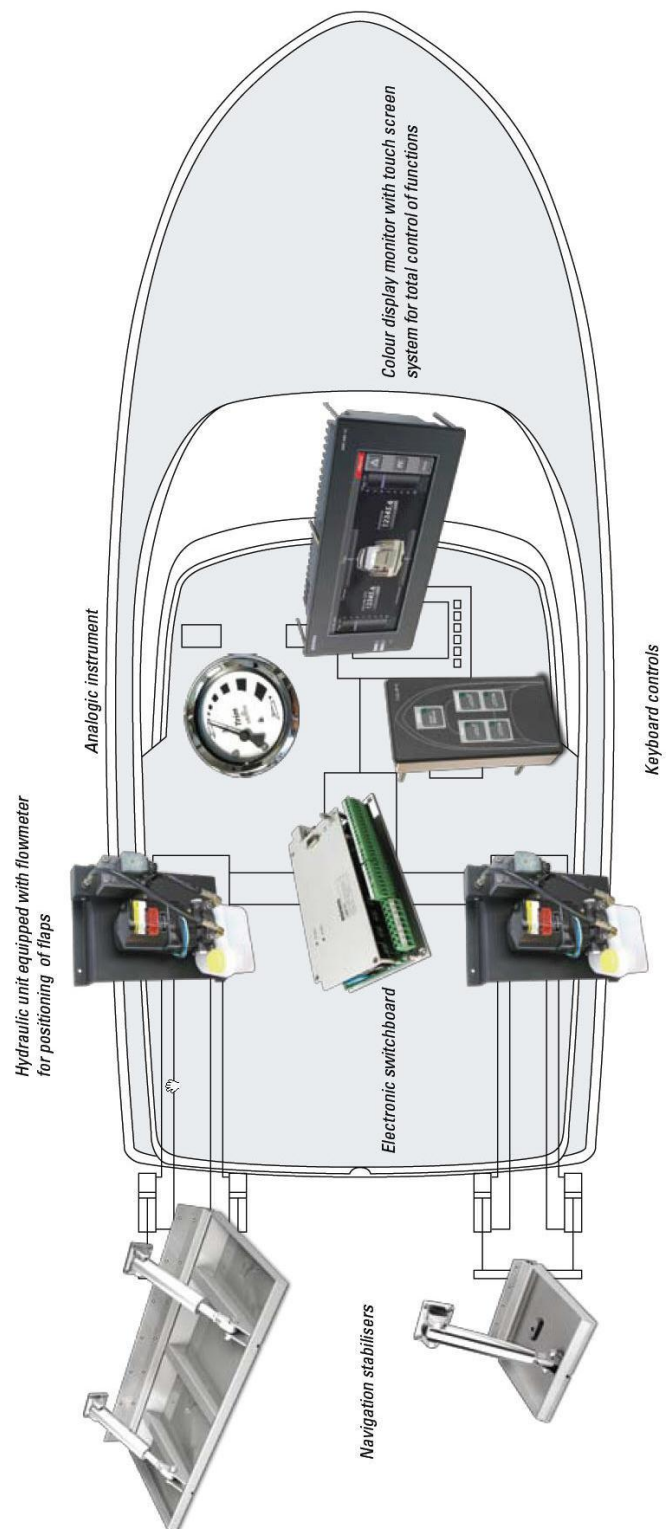
The backboard or starboard trim tabs' single or double action electro-hydraulic cylinders are controlled by the electronically operated directional control valves of the hydraulic aggregates AHD-TCS HYD.

*A special feature of this system is the elimination of often failure-prone electrical wiring outside the ship.*

Instead of the customary hydraulic transducers, special flow rate sensors, which convert the flow movements of the hydraulic fluid into impulses, are used. These are captured by the central electronic unit AHD-TCS A and used for the exact calculation of the trim tabs position.

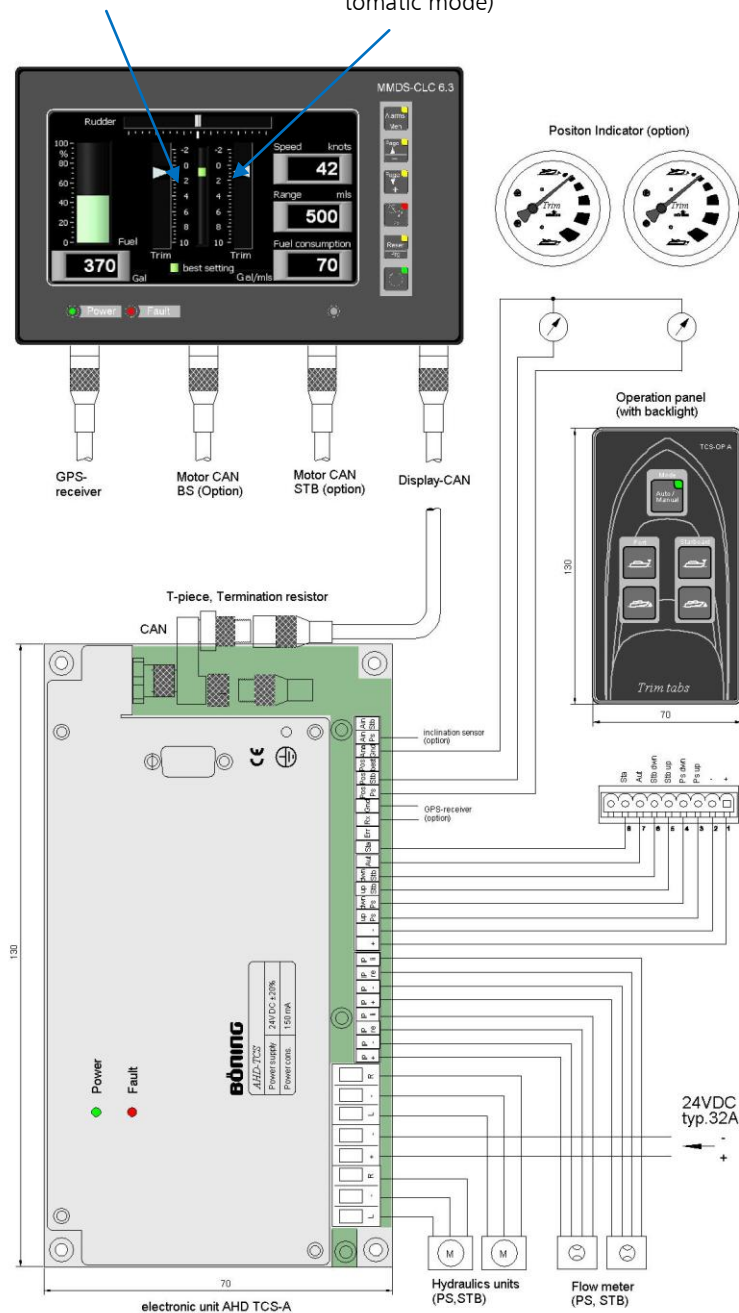
The electronic evaluation and control facilitates slight calibrations at any point in time. For this, the trim tabs must run through a full stroke in each direction when the ship engines are turned off. The calculated impulse-count is stored internally by briefly pressing and holding the operating key (ca. 5 sec.) after each respective stroke. Here, the upper end position is driven to first, after which one switches to the lower end position, returning to the original position in step 3. This way, both directions are measured separately and minor direction-dependent differences can be compensated.

Automatic trim tab retraction ensures that the hydraulic cylinders' pistons and gaskets are protected from fouling.



Current trim tabs position (backboard)

Optimal trim tabs position At current speed (default for automatic mode)



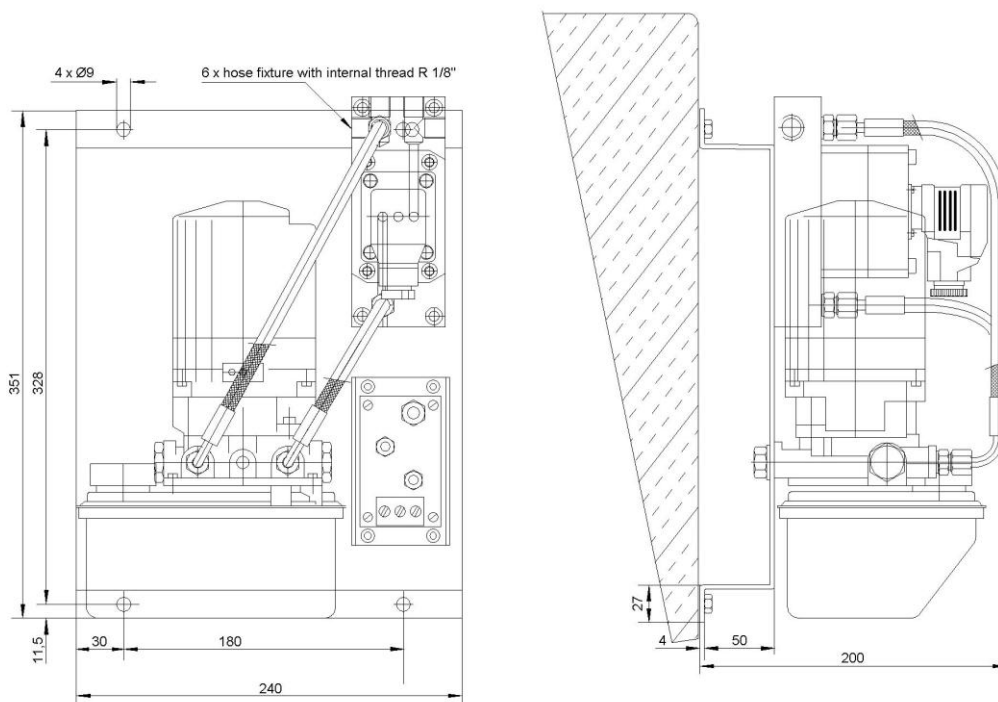
If the system includes a GPS-receiver (directly on the control unit AHD A-TCS or connectable to a display unit AHD 880 TC), trim tab control can also occur when in automatic mode. For this, the trim tabs' optimal position at different cruising speeds was determined and stored during commissioning at the shipyard.

Manual control of the trim tabs as well as activation of the automatic mode is done from the control unit AHD-TCS OP A via 5 keys. These are backlit and therefore easily recognizable even in darkness. The "Auto/Manual" key switches the automatic mode on or off. An LED signalizes the currently selected status. Upon activation, an optimal trim angle is adjusted dependent on the current cruising speed. Manual control takes place with the ship control keys (▼/▲). The trim tabs for PS and STB can be steered individually in the desired direction. This function runs even during failure of the control electronics. A possibly activated automatic mode is disabled immediately in the event of manual intervention.

The control unit AHD-A TCS provides all the data via a CAN bus. Thus, the trim tab position can be graphically (visually) displayed on a color display (e.g. AHD 651 or AHD 880 TC). The display can be part of an already existing ship alarm system. Alternatively, trim tab positions as well as defaults for optimal trimming can also be indicated on round gauges AHD-TCS ROUND. Control occurs directly from the control unit AHD-TCS A via 2 analog outputs (0-10 VDC).

Control unit, display and optional control instruments can be cascaded (e.g. for flybridge). Failure of the control electronics is detected via the CAN bus and displayed on a connected display.

## Dimensional drawings



## Technical data

<b>Hydraulic aggregate AHD-TCS HYD (1 unit per trim tab required)</b>	
Power supply:	24 VDC via TCS-electronics
Power consumption:	typ.16 A
Operating temperature:	-25°C...70°C
Storage temperature:	-30°C...85°C
Weight:	11 kg
Protection class:	IP65
External dimensions:	240 mm x 351 mm x 200 mm
Hydraulic oil quantity:	min. 0,75 l (container)
Inputs:	Hydraulic aggregate R, L, -
Outputs:	Flow meter left, right, +, -

<b>Color Display AHD 651</b>	
Power supply:	9...32 VDC
Power consumption:	450 mA
Resolution:	400 x 240 Pixels
Visible range:	6,5", 143,64 mm x 79,326 mm
Color depth:	65536
Luminous intensity:	200 cd/m <sup>2</sup> , transfective
Operating temperature:	-25°C...70°C
Storage temperature:	-30°C...85°C
Weight:	1,5 kg
Protection class:	Front side IP 67, back side IP 65
External dimensions:	210 mm x 130 mm x 95 mm
Panel cutout:	190 mm x 118 mm
Interfaces:	1 x CAN, 1 x RS 232
Inputs:	1 x binary (optocoupler)
Outputs:	2 x relay contact 40 VDC/1 A

<b>Electronic Control Unit AHD-TCS A in terminal box TCS-Box</b>	
Power supply:	24 VDC
Power consumption:	150 mA
Operating temperature:	-25°C...70°C
Storage temperature:	-30°C...85°C
Weight:	3 kg (without cable)
Protection class:	IP65
External dimensions:	295 mm x 180 mm x 125 mm
Interfaces:	1 x CAN, 1 x RS232
Inputs:	2 flow meters, 1 inclination sensor, 1 operation panel
Ausgänge:	2 hydraulic units, 3 analog instruments

<b>Color Display AHD 880 TC</b>	
Power supply:	9...32 VDC
Power consumption:	ca. 700 mA
Resolution:	640 x 240 Pixels
Visible range:	8,8", 209,28 mm x 78,48 mm
Color depth:	65536
Luminous intensity:	250 cd/m <sup>2</sup> , transfective
Operating temperature:	-20°C...70°C
Storage temperature:	-30°C...85°C
Weight:	2,0 kg
Protection class:	Front side IP 67, back site IP 65
External dimensions:	270 mm x 130 mm x 95 mm
Panel cutout:	259 mm x 114 mm
Interfaces:	3 x CAN, 1 x RS 232, 1 x Video In
Inputs:	1 x binary (optocoupler)
Outputs:	2 x relay contact 40 VDC/1 A