

ACS A

Attitude Correction System

User's manual



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Introduction

Thank you for buying an attitude correction system from Mente Marine. Take a minute to read through the user's manual and you will find how this device can enhance your boating experience. Keep this User's Manual for future reference. No matter if the boat is 15' or 50', ACS will set it up to the desired attitude.

Symbols and abbreviations

ACS Attitude Correction System
LED Light Emitting Diode
RPM Revolutions per minute

Security



Switch off the main circuit breaker or put the ACS into manual mode before lifting or transporting the boat. Should the automatics engage during transport, the trim tabs may be severely damaged.



Do not subject the box to shocks! The ACS contains precision electronics and for instance dropping it onto a hard surface may cause permanent damage.



Do not subject the device to ambient temperatures exceeding 70°C (160°F) while in operation.



The electronics is protected against moisture and water spray according to class IP66. Do not install it in a place where it may get completely wet!

Theory of operation

The deep-V hulls of modern pleasure boats are designed to give you a smooth ride in rough water. The deeper the V, the more need for trim tabs and power trim to maintain a straight attitude. The lateral or, starboard and port balance of the boat is largely dependent on wind and passenger location. The longitudinal or, fore and aft balance depends on speed and loading. When the course is changed, winds change direction and you need to trim the boat. When passengers move, trim again. This need, to constantly adjust the trim tabs, takes the driver's attention, which can even be a security risk at high-speed operation.

When speed changes, the trim angle changes. When winds shift or passengers move, the lateral attitude changes.



The Attitude Correction System (ACS) takes care of the work for you. When changing course, winds shift, or passengers move, the attitude of the boat is automatically corrected by adjusting the trim tabs.

Blocked while turning

While making a turn, the boat leans inwards. Thanks to the built-in yaw measurement, the system is able to detect heading changes and prevent automatic corrections while turning. Unnecessary adjusting is avoided and the boat exits the turn with optimum attitude. The AUTO indicator is blinking while making the turn to indicate that the ACS is blocked and not active at that moment. Once set up on a steady course again, the ACS continues measuring and correcting the attitude taking into account the altered conditions.

Adaptable system

The system adapts to boats over the whole range. Thanks to the adaptive functionality, a 15 feet walkaround or a 50 feet performance yacht is set up to optimum running attitude taking into account the difference in size.

It also adapts to varying sea conditions. In calm seas, a list condition is corrected faster than in rough seas. This allows fast reaction when needed and avoids unnecessary operations that could amplify roll in high waves.

Wireless rpm measurement



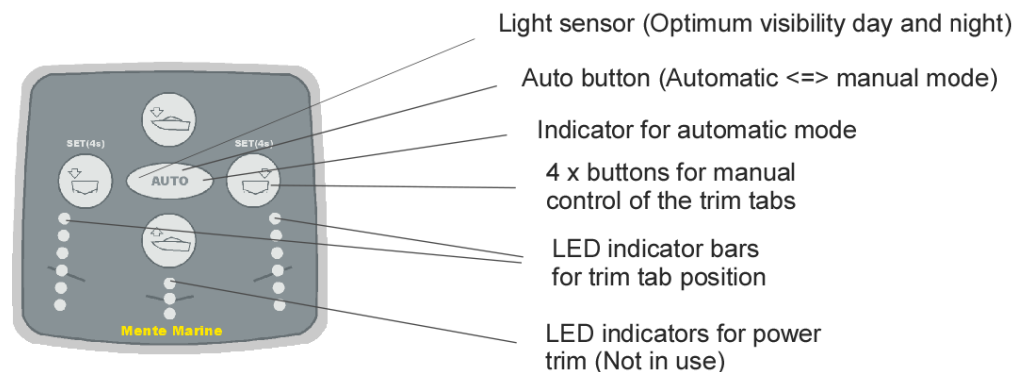
When slowing down, below the planing threshold, trim tabs lose their effect. ACS is aware of this and does not attempt to trim list conditions while off the plane. When accelerating, the ACS automatically starts up, correcting the attitude back to the desired even before the boat “breaks over” and reaches the cruising speed.

This is made possible by using a technique for wireless rpm measurement, which does not require any sensor installation or maintenance.

Position indication

ACS shows trim tab position by lighting an indicator LED for each trim tab. When a tab is extended, the lit up indicator LED moves downwards. While controlling, the indicator LED adjacent to the one lit up, is blinking, to show the control direction. No additional sensors are needed and ACS shows trim tab position for all types of trim tabs after calibration.

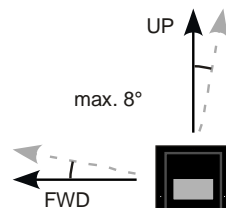
After installation, check the functionality of the light sensor by placing a finger on it to simulate darkness. The intensity of the LED indicators should be reduced.



Installation

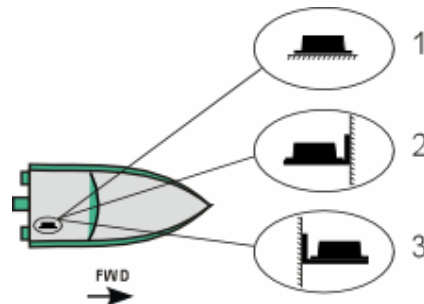
Installing the box

The box is intended for wall mounting in an upright position. The label on the front side is marked with an UP arrow that should point upwards and a FWD arrow that should point in the forward direction. Exact mounting is not critical, however, as the desired running attitude is set after installation.



Install the box in the engine room as close to the trim tabs as possible to minimize the length of the high current cables. Avoid installing it close to noisy equipment like heaters or fans that may disturb the rpm measurement.

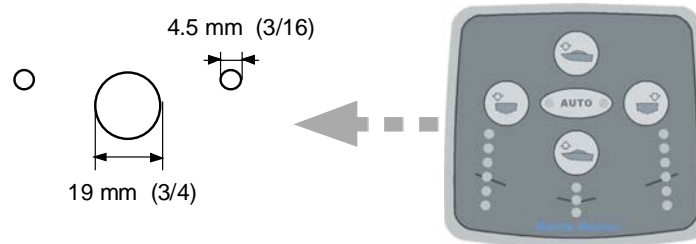
If there is no wall aligned fore to aft, on which the box can be mounted directly, use the mounting bracket. The mounting bracket has four sets of screw holes. One set for use when the bracket is floor mounted, another when roof mounted and two sets when wall mounted. Using the bracket, the ACS can be mounted on either side of a wall perpendicular to the fore-aft line of the boat.



1) Wall mounted 2)3) Wall mounted using mounting bracket

Installing the control panel

To install the control panel, choose a location near the helm where it is convenient to access and drill two 4.5 mm holes using the enclosed drill pattern. Drill a 19 mm hole for the connector. Apply the gasket on the control panel and secure it with the nuts. If the panel is mounted on flybridge or in an open boat, make sure the installation is watertight.



Connection

IMPORTANT! In retrofit installations, disconnect the old wires before connecting the ACS. Parallel connection may cause a shortcircuit even before connecting the supply voltage to the ACS.

Hydraulic trim tabs

Hydraulic trim tabs, like Bennett, Instatrim, QL and Trimmaster use a hydraulic pump unit to extend and retract the actuators. The pump unit is situated in the rear of the boat and connected to the battery's negative (-) terminal. From the pump unit, a wire harness is routed to the ACS.

Connect the wires to the ACS terminals 3, 4, 5, 6 according to the figure that follows. Terminals 5 and 6 are connected to the pump's motor and terminals 3 and 4 to the valves controlling the trim tabs.

The table below shows the colours used by the major manufacturers of hydraulic trim tabs. Corresponding ACS markings are shown in the left column.

| ACS marking | Instatrim (QL) | Bennett | Trim-master | TFX Teleflex | TX Controls |
|-------------|----------------|---------|-------------|--------------|-------------|
| 3 | White | Green | White | Yellow | Grey |
| 4 | Green | Red | Green | Blue | Blue |
| 5 | Yellow | Yellow | Yellow | - | Red |
| 6 | Red | Blue | Red | Red | Black |

Electromechanical trim tabs

Connect the starboard actuator to terminals 4 and 6 and the port actuator to terminals 3 and 5 according to the figure that follows. Verify the connection later on and change it if necessary.

| ACS marking | Lenco | Lectrotab |
|-------------|--------------|--------------|
| 3 | Black (port) | White (port) |
| 4 | Black (stbd) | White (stbd) |
| 5 | White (port) | Black (port) |
| 6 | White (stbd) | Black (stbd) |

Control panel

Connect the control panel's yellow wire to terminal 7, green to terminal 8, brown to terminal 9 and white to terminal 10 on the ACS.

The red wire is connected to the ignition key run position. For Volvo Penta EVC EC and other electronically controlled engines, the red wire should be connected to the relay for external accessories.

NB! In retrofit installations, remove or disconnect the old control panel before taking the ACS into use. Parallel connection may cause a shortcircuit.

Supply voltage

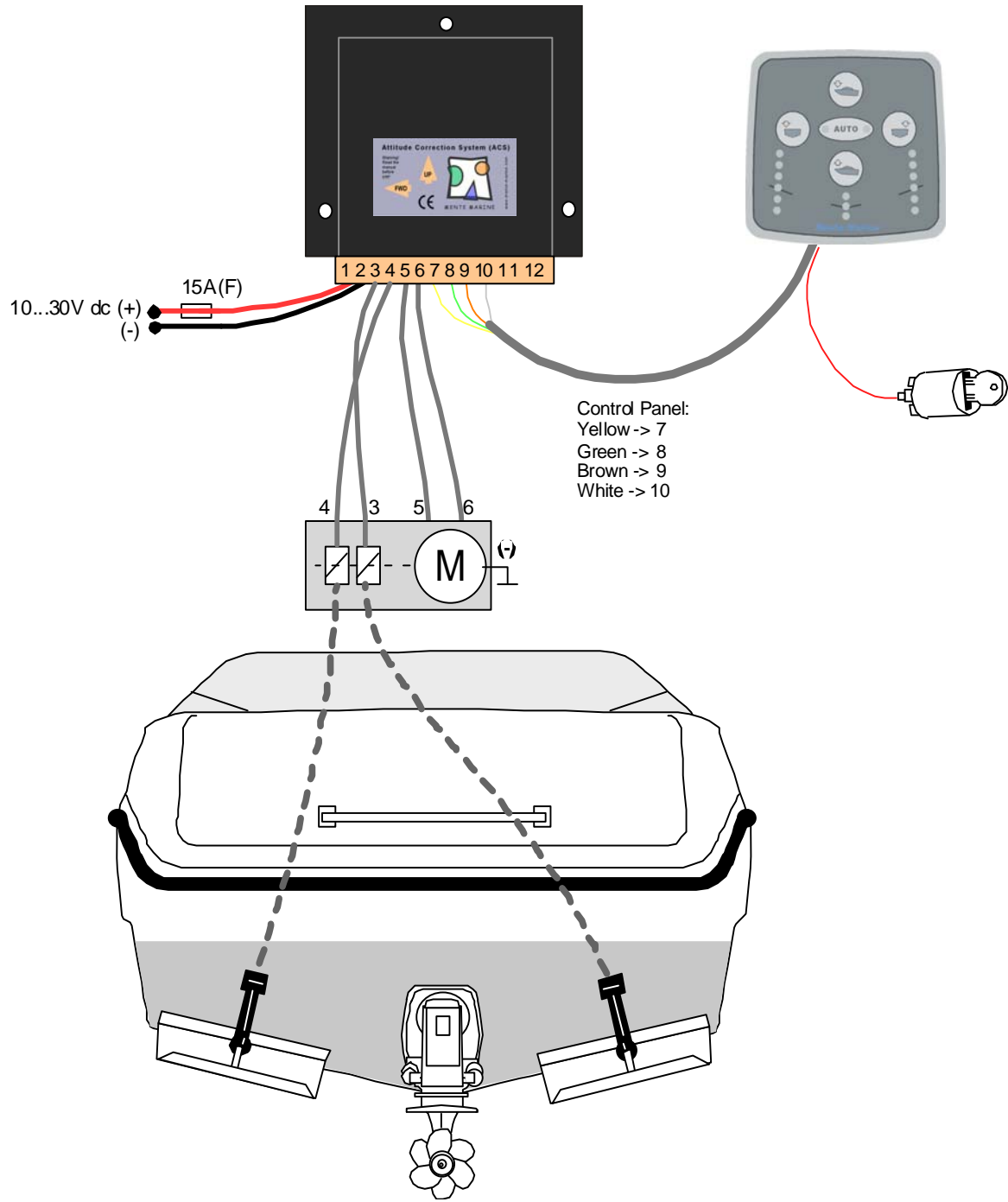
Connect the red wire to the boat's main circuit breaker through the fuseholder. Do not insert the fuse in the fuseholder until the installation is completed.

Connect the black wire to the battery's negative (-) terminal.

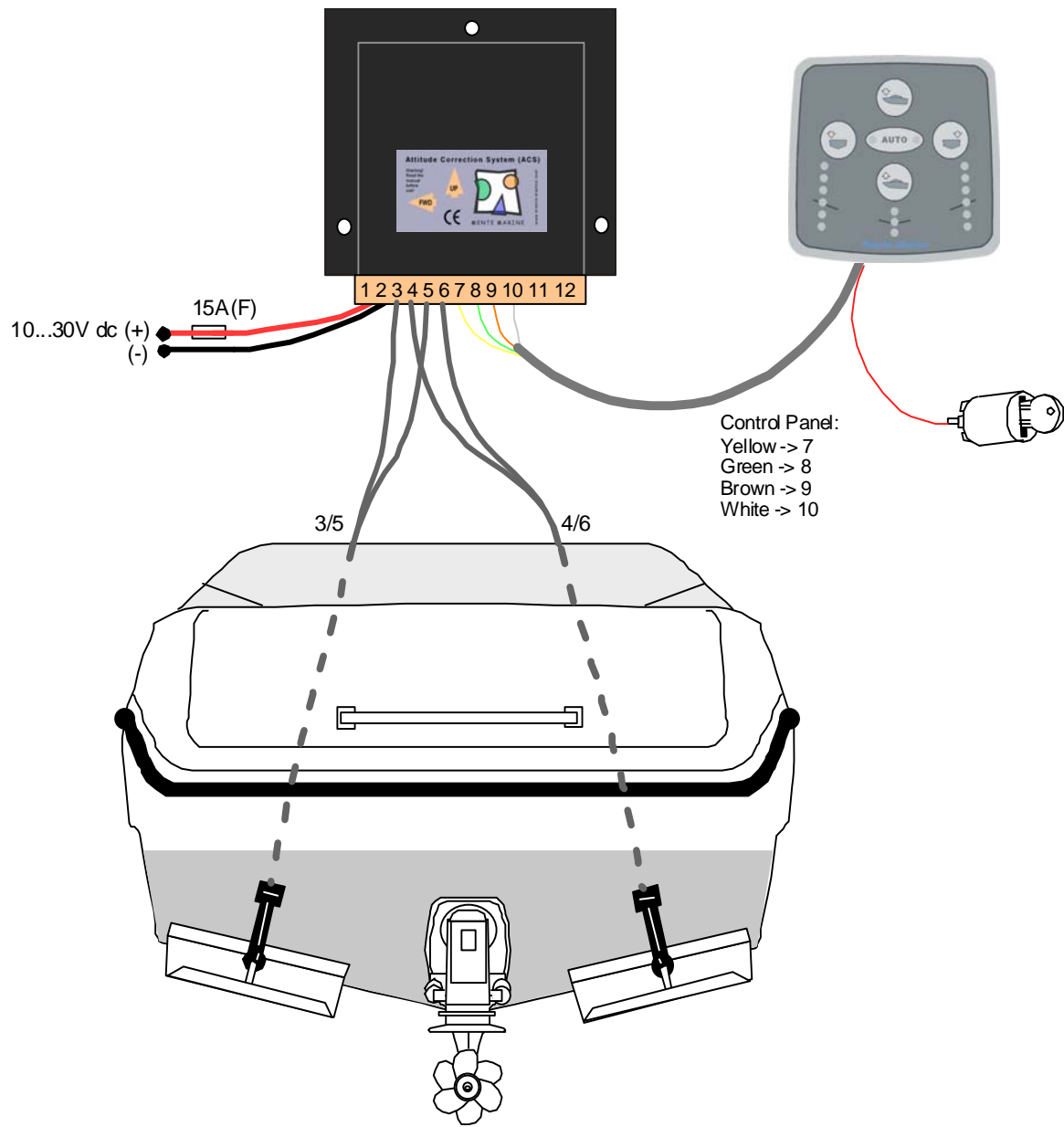
Flybridge panel

If the boat has a flybridge, and two control panels are preferred, an extra control panel is available under product name FCP (Flybridge Control Panel). It is installed the same way as the ordinary panel and connected in parallel to the ACS terminals. Strip the wires 13 mm. Then insert the two wires of the same colour into the supplied ferrules and tighten with the screw connector. No special tools needed!

Both panels are active at the same time and the flybridge panel controls the tabs manually, engages the automatics and shows trim tab position exactly the same way as the ordinary panel.



Connection to hydraulic trim tabs.

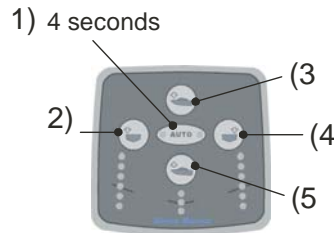


Connection to electromechanical trim tabs.

Calibration

For the ACS to operate properly, it needs to know the trim tab type, position, and current consumption. This information is automatically acquired and stored in memory during calibration. Before you start, secure that no obstacles hinder free run of tabs. Turn the ignition key to run position to activate the ACS.

- The AUTO indicator is blinking to indicate that calibration is needed.
- Press the AUTO button for 4 seconds until the indicator LED starts to blink fast.
- Press the button sequence 2 -> 3 -> 4 -> 5 for calibration. An indicator LED in the left and right bar starts to blink. For every press, the blinking indicator LED's move one step downwards.



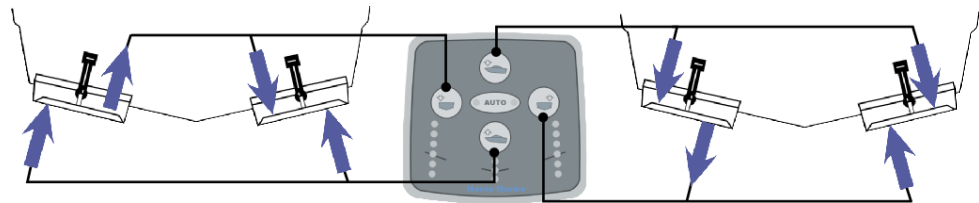
- The ACS will now run the trim tabs to their uppermost position. The starting position does not matter.
- From the uppermost position, the tabs are run downwards and back up again. This procedure may take up to 60 seconds and should not be interrupted.
- After completion, the indicator LED's stop blinking. Port trim tab position is now shown by the left bar and starboard by the right bar.

Verify connection

IMPORTANT! After calibration, verify the connection by pressing the buttons one by one and observing the trim tabs. Should the trim tabs move in the wrong direction when manually controlled, they will do that also in the automatic mode.

- Press the uppermost button and keep it depressed. Both trim tabs should move downwards.
- Press the lowermost button and keep it depressed. Both trim tabs should move upwards.

Should the trim tabs move in the wrong direction: For hydraulic trim tabs, exchange the 5 and 6 wires, for electromechanical trim tabs, reverse the wires of the actuator(s) that move in the wrong direction.



- Press port button and keep it depressed. Port trim tab should then move upwards first and then starboard tab downwards.
- Press starboard button and keep it depressed. Starboard trim tab should then move upwards first and then port tab downwards.

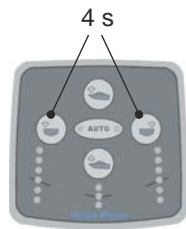
Should the trim tabs move in the wrong direction: For hydraulic trim tabs, exchange the 3 and 4 wires, for electromechanical trim tabs, exchange 4 and 6 wires with 3 and 5 wires.

The ACS is now ready for operation. Verify the installation by disconnecting and connecting the power supply. Count the beep signals upon connection. More than two signals indicate some problem with the installation.

Usage

After installing and calibrating, take the boat for a test drive and store the attitude as described below.

Run the boat at cruising speed. Manually control the trim tabs until you find the best attitude. Then, press the left and right buttons together for 4 seconds. Now, the attitude is stored in memory, the indicator LED to the right of the AUTO button is lit up and ACS set in automatic mode.



In automatic mode, the desired attitude can be tuned by pressing any of the four buttons e.g. pressing starboard button once sets the boat 0.3 degrees to starboard. Pressing the uppermost button lowers the bow 0.3 degrees.



Now, if the speed is reduced, automatic control is suspended and the AUTO indicator starts blinking. The functionality is then temporarily interrupted to avoid deflecting the tabs at too low speed.

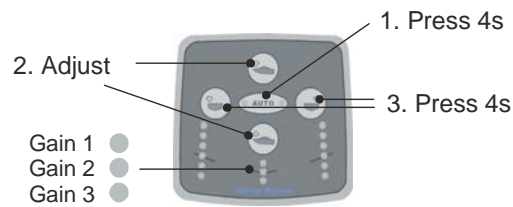
Automatic mode is re-entered every time you go out until the ACS is put into manual mode. By pressing the AUTO button you can toggle between automatic and manual mode. The running attitude remains stored although main breakers are switched off.

Adjusting gain

The gain determines how fast the ACS should correct a list condition. It can be adjusted in three steps and the default setting is step 1. Step 2 provides a bit faster correction while step 3 is the fastest. The setting is optimized if a list condition is corrected without the boat leaning over to the other side and the trim tabs are not operated too often. As a rule of thumb, boats longer than 35 feet should use settings 1 and 2 while boats below 35 feet may use settings 2 and 3.

To change the gain setting, do as follows:

- Press the AUTO button for 4 seconds until the indicator LED starts flashing.
- Press the uppermost or lowermost button to adjust the setting.
- The three indicator LED's in the middle show the setting. The uppermost LED shows step 1, the 2nd LED step 2 and the lowermost LED step 3.
- Then, press the left and right buttons together for 4 seconds. Now, the LED indicator is blinking in the beginning and lit up when the new setting is stored.



Retraction

The ACS automatically retracts the trim tabs when the engine is shut off and they are no longer needed. This is to prevent fouling of the piston rods, which may destroy the actuator gaskets with resulting leaks.

Shut down

When the engine is switched off, and the trim tabs have retracted, ACS shuts down drawing minimal current from the battery. This feature prevents battery drain and the boat may be left for months with main breakers on.

ACS is activated next time the ignition key is turned to run position.

Troubleshooting

No calibration

When all the buttons have been pressed according to instructions, the ACS should calibrate. If it cannot calibrate, the AUTO indicator continues blinking after trying for a few seconds. It may depend on:

1. Wrong connection of trim tabs
2. Shortcircuit in the trim tab motor or valves

Two indicator LED's are blinking

The current consumption of the valves controlling the trim tabs (only hydraulic trim tabs) is checked at calibration. Should it later on exceed the maximum, two indicator LED's start blinking. It may depend on:

1. Wrong connection of trim tabs
2. Shortcircuit in the trim tab valves

Four indicator LED's are blinking

If the control panel cannot communicate with the main unit, four indicator LED's will start blinking. Check the wiring!

Specifications

| | |
|--|---|
| Compliance (Hydraulic tabs) | Bennett, Instatrim, Trimmermaster, QL Volvo Penta, TFX Teleflex, TX Controls |
| Compliance (Electromechanical tabs) | Lectrotab, Lenco, Eltrim, Minn Kota (ACS iC is compliant with QL Boat Trim System interceptors) |
| Boat length | 15...50 feet |
| Tab type detection | Automatic |
| Gain | Automatic, adapts to the boat type |
| Size | 120 * 110 * 40 mm |
| Weight | 330 g |
| Protection by enclosure | IP 66 |
| Operating temperature | -10...70 °C |
| Storage temperature | -40...+85 °C |
| Supply voltage | 10...30 V dc |
| Maximum output current | 18 A (When tabs activated) |
| Current consumption | 0.05 A (When idle) |
| Shut-down timer | Yes (After engine shutdown) |
| Approvals | CE (Compliance with EMC regulations) |



The CE marking assures that this product complies with the requirements of the EC directive for electromagnetic compatibility.

Warranty policy

All ACSs (Attitude Correction Systems) purchased through authorized distribution channels are guaranteed against defects of material or workmanship for a period of 24 months from date of purchase. Service will be rendered, and defective parts will be replaced without cost to you within that period, provided the equipment does not show evidence of impact, liquid damage, mishandling, tampering, or chemical corrosion, operation contrary to operating instructions, or modification by an unauthorized repair shop. The manufacturer or its authorized representatives shall not be liable for any repair or alterations except those made with its written consent and shall not be liable for damages from delay or loss of use or from other indirect or consequential damages of any kind, whether caused by defective material or workmanship or otherwise; and it is expressly agreed that the liability of the manufacturer or its representatives under all guarantees or warranties, whether expressed or implied, is strictly limited to the replacement of parts as herein before provided. No refunds will be made on repairs performed by non-authorized service facilities.

Procedure during 24-month warranty period

Any ACS that proves defective during the 24-month warranty period should be returned to the dealer from whom you purchased the equipment or to the manufacturer. If there is no representative of the manufacturer in your country, send the equipment to the manufacturer, with postage prepaid. In this case, it will take a considerable length of time before the equipment can be returned to you owing to the complicated customs procedures required. If the equipment is covered by warranty, repairs will be made and parts replaced free of charge, and the equipment returned to you upon completion of servicing. If the equipment is not covered by warranty, regular charges of the manufacturer or of its representatives will apply. Shipping charges are to be borne by the owner. If your ACS was purchased outside of the country where you wish to have it serviced during the warranty period, the manufacturer's representatives in that country may charge regular handling and servicing fees. Notwithstanding this, your ACS returned to the manufacturer will be serviced free of charge according to this procedure and warranty policy.

In any case, however, shipping charges and custom clearance fees are to be borne by the sender. To prove the date of purchase when required, please keep the receipts or bills covering the purchase of your equipment for at least two years. Before sending your equipment for servicing, please make sure you are sending it to the manufacturer's authorized representatives or their approved repair shops, unless you are sending it directly to the manufacturer. Always obtain a quotation for the service charge, and only after you accept the quoted service charge, instruct the service station to proceed with the servicing.



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