Item No. 1584-TMX/S

Tmax V2

Proportional
Piston Tank Control
Version 2

with (optionally available)
Static Depth Controller
TAES

Installation & Operation

Please read the following instructions and safety warnings carefully BEFORE you commence with the assembly of this unit and installation of the dive system. For further safety instructions please refer to the instructions supplied with Piston Tanks.

Only operate Piston Tanks when switch unit is completely connected. Otherwise Piston Tanks will inevitably be damaged, resulting in total failure of the system.

During the charging period all batteries must be removed from the hull. **NEVER** charge batteries inside the hull as almost all battery types gas while being charged. Insufficient air circulation during the charging period may lead to a serious **EXPLOSION!**

Engel Dive Systems have been primarily designed for use in Engel model submarines. Therefore, we cannot guarantee satisfactory installation and/or operation in self-made models or kits of other brands.

We are not liable for any personal injury or damage of any kind incurred during the assembly and/or use of our products as we are neither able to delegate nor verify the assembly and/or use of these items. Please adhere to your country's safety guidelines during construction and operation of this item. This product is not suitable for persons under 16 years of age. Technical specifications are subject to change without notice.

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The Tmax offers a maximum of features for controlling Piston Tanks. Tmax version 2 (V2) is equipped with a regulated power supply for the processor, by which susceptibility to radio interference is minimized.

As the functions of this system are quite extensive, it is absolutely necessary to study the following instructions and diagrams carefully before commencing with the setup of the system.

The Tmax System is designed to control two Piston Tanks type XP, equipped with potentiometers in addition to the micro switches of Piston Tank type EA (AutoStop). The Tmax System can be operated via one, two or three R/C channels. However, for implementing all functions of the system three R/C channels are necessary. This setup will require an analogue switch (3 positions: on/off/on) and two proportional slider switches. All three channels (including the switch) must be operated via "pure" proportional channels - NOT via so-called switch modules/decoders (such as Robbe Multi Switch).

The maximum operational depth is limited to about 1.8 meters by the pressure switch which is an integral part of the system. Furthermore, the Tmax offers additional fail-safe features such as battery monitor and loss of Tx-signal. These safety devices make this unit to be the most developed and reliable system currently available.

With the voltage dropping below the preset threshold value, the piston tanks will start to press water out of the cylinders. If this is the case, the bow-sided tank will start to press out ballast water first. After a pause of about 15 sec. the stern tank will start to empty. This sequence is to minimize the strain on the already weakened battery pack. After a low battery voltage has been identified further operation of the system will only be possible after the battery pack has been fully charged.
Threshold voltage for 6 Volt system is preset to approx. 4 Volt, for 12 Volt systems to approx. 9 Volt. Threshold voltage can be adjusted via the potentiometer on board of the Tmax. However, a regulated power supply is recommended to achieve an exact setting.

The fail safe device controlling loss of signal is preset to approx. 2 sec. (default setting; both pins [JP1] are bridged) This time span can be increased to approx. 5 sec. by resetting the jumper so that the two pins [JP1] are not connected (not bridged).

The yellow LEDs [LED1 and LED3] indicate that the relays have switched to the "surfacing mode". The red LEDs [LED2 and LED4] indicate that the "submerge mode" is active.

The status of the system is indicated by specific blinking frequencies of the green LED [LED5].

Blinking frequencies of green LED [LED5]
OFF = emerged (fully surfaced)
1x = trimming via proportional slider switch
2x = Static Depth Controller TAES activated (only with optionally available TAES)
3x = parking on ground
4x = pressure switch activated
∞ = battery monitor has detected low voltage (permanent blinking)
ON = loss of signal

The second green LED [LED6] serves as monitor-LED for optical evaluation of remaining main battery voltage.

The operational circuit (i.e. 6 or 12V) is equipped with a fuse protection (10A, slow blow). A second fuse is included as spare.

Switch unit Tmax can be upgraded with a Static Depth Controller, so-called TAES (Tmax + TAES = TmaxS). The TAES requires an additional outboard connection (brass tube, drilled and glued into the hull's outer walling) for the depth sensor integrated in this optional unit.

Functioning of the Tmax in combination with Static Depth Controller TAES requires PIC (software) version v2.1 (item no. 5207-021, "yellow dot" version). The corresponding PIC version is given on the front side of the Tmax's outer relay. PIC versions v1.1 and v1.2 need to be exchanged against v2.1.
Upgrading is simple - as the PIC rests on a socket no soldering is necessary.

TRANSMITTER (Tx) SETUP

The Tmax processes a variety of commands and combinations thereof. Therefore, it is advisable to control the Tmax via proportional slider switches and a 3-position switch (on/off/on) on the transmitter (PIC v2.1). Slider and 3-position switches are available for all renowned R/C systems. For installation please refer to the manual of your R/C.
Transmitter setup is also illustrated on diagram "Transmitter Setup".

Trouble-free operation of the switch unit might only be possible in PPM modulation. In PCM modulation the unit may show dysfunctions (or not operate at all) due to non-standardized transmission signals in PCM. Ensure that your R/C system (transmitter and receiver) can be used in PPM. Please refer to the manual of your R/C for setting your system to PPM.

CONNECTION TO RECEIVER (Rx)

The connector cables are plugged into the receiver as shown on the diagram. Channels used on the diagrams are 5, 6 and/or 7. However, this allocation of channels is only exemplary and depends on individual R/C setup.

FUNCTIONS

A. If only a single R/C channel (K5) is used the following conditions are possible:

1. Empty
2. 90% filling volume
3. 100% full

This setup does NOT allow for proportional control of Piston Tanks.

B. If a second R/C channel is used (alternatively K6 or K7) the three filling conditions stated in A are possible. Furthermore, the boat can be trimmed stern- or bow-heavy via channel K6 OR alternatively fine-trimmed via channel K7.

C. If all three R/C channels are used, the model can be trimmed stern- or bow-heavy AND fine-trimmed.
If the boat is i.e. trimmed stern-heavy, fine-trimming is also possible, without altering the stern-heavy trim.

CONNECTION OF PISTON TANKS

The connection of Piston Tanks to Tmax must be made as per wiring diagram.
The micro switches of each Piston Tank are connected with wire leads (0.5 sqmm). These leads are supplied in different colours for easy identification of the various connections to be made. Refrain from using thinner leads!

The two triple-core (servo) leads are used for connecting the potentiometers on Piston Tanks to Tmax. The potentiometers are each equipped with a printed circuit board (PCB) with three pads to which the wire leads must be soldered. First, cut the three cores to length (note that the orange wire needs to be longer than red and brown!). Then part the cores at a length of approx. 50 mm. Slide each wire through the bores at the front of the PCB from above. Then cut the wires to length, strip the insulation and solder the blank ends to their corresponding pads.

Please ensure that all soldered connections are made with great care as a bad connection can cause failure of the system. Already a single incorrect connection can lead to the destruction of the fuse! Blocking of a motor should also be avoided as this can also damage the electric components of the system.

All motor housings of the model (including main drive motors) should be connected to "ground" (negative pole of main drive battery). This will further decrease probability of radio interference.

DO NOT operate the piston tanks if switch unit is not completely connected!
Otherwise you risk damage of the Piston Tank mechanism.

CONNECTING PRESSURE SWITCH

The electric connection between pressure switch and Tmax is made of the two-core lead supplied.

Pins 1 and 3 of the pressure switch are connected to the corresponding ports on the switch unit as illustrated. The allocation of pins on Tmax connecting to the pressure switch is not of any relevance. Just make sure that on the pressure switch only pins 1 and 3 are used!

The nozzle of the pressure switch is connected via a silicone hose (4/2 mm) to an outboard connector (brass, 4/3 x 15 mm), drilled and glued into the outer walling of the hull. Refer to "Wiring and Functional Diagram" for further detail.
For submarine type VII/c this outboard connector is already pre-fitted within the main drive unit.

After all connections have been made the system can be put to the test.

FUNCTIONAL TEST of Piston Tanks

Before initial operation of the Piston Tanks, draw out the spindles so that these are extended to the level of the motor back plate. This must be done by hand - do not connect a battery directly to Piston Tank motors - otherwise the switch unit might be damaged!

The initial extended position of the spindles is crucial in order to safely determine the correct running direction of the Piston Tank motors. If one or both spindles are drawn inwards although the "submerge mode" is activated, the polarity of the motors must be changed by swapping the wires on the motor (NOT the switch unit!).

Follow this sequence for activation of the dive system:

1. switch ON Transmitter
2. switch ON main battery
3. switch ON receiver

Any other sequence will lead the Tmax to fall into one of the following safety modes:

1. transmitter NOT ON: loss of signal
2. main battery NOT CONNECTED or WEAK: low battery monitor activated
3. transmitter NOT ON: Tmax shows NO function

Any failure criteria leads to deactivation of the dive mode!

These safety prompts are necessary to ensure maximum safety of the boat.
In case of wrong sequence during activation of Tmax, switch off receiver and restart. The system is then ready for action (unless the main battery is too weak).

Please note: sufficient receiver battery power is also necessary for functioning of the system. Unless you are using BEC, a high power receiver battery pack (e. g. NiMH 4.8V/3000mAh, item no. 5528) is highly recommended.

FUNCTIONAL TEST of Pressure Switch

When blowing forcefully into the tube of the pressure switch the "resurface mode" will automatically be activated even if the "submerge command" is given. If the "submerge mode" is activated and the Piston Tanks are running, the signal of the pressure switch will override this command and force the model to resurface.

The pressure switch acts as a safety device which comes into action as soon as the model has submerged beneath a depth of approx. 1.8 meters, forcing the model to resurface. However, activation of the pressure switch depends on Water Tight Compartment (WTC) volume (set for ENGEL standard WTCs).

The pressure switch incorporates a further safety feature:
If the over pressure of approx. 0.12 bar inside the hull (which develops by compressing the air within the hull when flooding the tanks) decreases due to a leakage, the pressure switch will terminate the "submerge mode" allowing the model to resurface only. This feature ensures that only a minimum amount of water may enter the WTC in case of a leaking O-ring or other kind of gasket.
As long as the leakage remains the model cannot be submerged.

To assure the full functionality of the model the WTC must be absolutely hermetically sealed.
Even a small leakage will cause a deactivation of the "submerge mode".

FUNCITIONALITY OF R/C CHANNELS

A. Operation via 1 R/C channel
Switch K5 is in its upper position.
When pushing switch K5 from upper to centre position, the spindles will drive outwards until the potentiometer is drawn to its center position.

Filling volume of the Piston Tanks will then be at about 90%.In this position the boat should then be in neutral buoyancy.

B. Operation via 2 R/C channels
Switch K5 is in its upper position.
When pushing switch K5 from upper to center position, the spindles will drive outwards until the potentiometer is drawn to its center position.

Filling volume of the Piston Tanks will then be at about 90%.In this position the boat should then be in neutral buoyancy.

Now the model can be trimmed stern- or bow-heavy via proportional slider switch K6.

When pushing switch K5 to its down position, the Piston Tanks will be filled to 100%. Both Piston Tanks will stop instantly at this filling volume. When pushing switch K5 to its upper position, both Piston Tanks will be entirely emptied (0% volume). Again, both Piston Tank motors will switch off instantly as soon as they have reached this position.

C. Operation via 3 R/C channels (recommended)
Switch K5 is in the upper position.
When pushing switch K5 from upper to center position, the spindles will drive outwards until the potentiometer is drawn to its center position.

Filling volume of the Piston Tanks will then be at about 90%.In this position the boat should then be in neutral buoyancy.

The model can then be fine-trimmed via proportional slider switch K7.
In addition, the model can be trimmed stern- or bow-heavy via proportional slider switch K6.

When pushing switch K5 to its down position, the Piston Tanks will be filled to 100%. Both piston tanks will stop instantly at this filling volume.

When pushing switch K5 to its upper position, both Piston Tanks will be entirely emptied (0% volume). Again, both Piston Tank motors will switch off instantly as soon as they have reached this position.

A detailed description for all functions is given by diagram "Transmitter Setup" (see last page of this manual), assuming that all possible R/C channels are used. The last picture on the diagram solely refers to the TmaxS system (Tmax + Static Depth Controller TAES).

With the potentiometers of both Piston Tanks in their center position the model must initially be trimmed manually (by adding or removing lead from the model) to neutral buoyancy, meaning that the submerged model does not submerge any further but remains at the corresponding depth. Nevertheless, a slight positive buoyancy of approx. 5-7 grams should remain.

STATIC DEPTH CONTROLLER TAES (optional)

The Static Depth Controller supports the trim of the submerged, static (zero velocity) model. This separate unit measures the pressure differentials during submerging and resurfacing which are then equalized by water being sucked in and pressed out of the Piston Tank cylinders. With TAES activated, no further manual trimming via the transmitter is necessary, thereby allowing the model to automatically level itself off at a desired depth. However, the exact basic trim (with lead ballast) of the model is essential for the system to work effectively. The better basic trim, the less up- and downwards movement during TAES mode (automatic levelling).
Erratic up- and downward swinging is a clear indication of poor basic trim.

Static Depth Controller TAES does not act as a substitute for pitch controllers as TAES is not effective whilst the model is in forward motion. Automatic adjustment of depth and/or horizontal position of the model in forward motion can only be facilitated by MiniPitchController (item no. 1570, for pitch control) or Pitch & Depth Controller LTR5 (item no. 1575, for combined pitch and depth control).

CONNECTING STATIC DEPTH CONTROLLER TAES

Tmax and TAES are joined with the supplied 4-pole cable with pre-fitted socket contacts.
Ensure, that the BROWN lead is plugged onto the outer pin of the Tmax marked with "b".
The contact pin on TAES for the BROWN lead faces outwards.

The standard version (1585-TAES-B) includes an approx. 240 mm long cable with socket contacts on both ends. The standard TAES version is mounted separately from the main switch unit Tmax on a hexagonal distance piece with a screw (thread M3). The vertical/horizontal position of the unit is irrelevant. The nozzle of the pressure sensor must be connected to an outboard connector (brass tube 3/2 x 15 mm) via a silicone tubing (approx. length 100 mm), both included in this option.

Static Depth Control for submarine VII/c requires a special TAES version with approx. 50 cm long cable (item no. 1585-TAES-V) which is pre-soldered to the TAES. The VII/c-version is screwed directly onto the respective carrier in front of the aft Piston Tank (with a washer used as spacer between TAES and carrier) and connected to the brass tube running just below this position towards the assigned outlet tube pre-fitted within the main gear unit.

ACTUATION OF STATIC DEPTH CONTROLLER TAES

To activate this function first switch K5 to "parked on ground" (down position) and back to neutral (centered) position as soon as the desired depth has been reached. The model will then oscillate to "neutral buoyancy". Please note that the exact basic trim (with lead ballast) of the model is essential for the system to work satisfactory. Actual trim condition will hereby be taken into account and can still be adjusted via K6. With K7 the model can still be trimmed bow or aft heavy.

For termination of TAES mode switch K5 must only be shortly actuated to "surface" (upward position). The system will then return to regular operational mode.

Each function is indicated by the green LED [LED5] on the Tmax.

MOT CONNECTION

The two ports marked with MOT on the Tmax are only operational when Static Depth Controller TAES is connected.
As Static Depth Control is only effective whilst the model is static (submerged at zero velocity), TAES mode is automatically terminated with the main drive in operation. The deactivation minimizes unnecessary strain on the system by eliminating unintentional automatic trimming of the Piston Tanks with the main drive in operation. This is also beneficial in terms of power consumption.
The stimulus threshold for this automatic termination for 12V systems is at about 30% speed or higher. For 6V operation threshold value might proof to be much higher or not effective at all. If the latter is the case the TAES mode must be terminated manually.

Excessive trimming may lead to system overload. However, a so-called "fallback function" will ensure safe resurfacing of the model. In such an extreme case just give the command "resurface" and allow the model to emerge up to sea level. This will ensure a full reset of the system, after which all functions will then become fully operational again.

FURTHER CONNECTIONS

For connection of the nozzles of the Piston Tanks PVC hosing 9/6 mm is used. These connect to outboard tubing connectors 8x16 mm (item no. 1589-401).

Outboard tubing connectors must be glued in with 2-component adhesive (e.g. 1-Hour Epoxy, item no. 9507). In general, hoses must not be fixed with cable ties or similar but are held securely down to a depth of 25 m [i.e. 2.5 bar]).

The WTC should be equipped with a breather made of a piece of brass tube and PVC hose. The breather allows pressure equalization and, furthermore, for blowing pressure into the hull to identify possible leakages. The brass tube should lie at the lowest point of the WTC. The hose is pushed onto the brass tube from the outside and closed-off with a knob (e.g. brass rod dia. 5 x 30 mm). If the hull is pressurized through the tube (with the mouth - DO NOT use a pump!) any water inside the hull (for whatever reason) will be forced out through the tubing. This allows you to verify that really everything is absolutely "pressure proof".
Submarine type VII/c already incorporates a breather fitted within the main drive unit.

FURTHER SETTINGS

P1: Loss of Signal

Tmax features a safety device which forces the model to resurface in case that transmitter signal is interrupted for a specific time span. This downtime can be adjusted by resetting the JUMPER on contact pins P1.

- contact pins P1 are connected (bridged) by JUMPER downtime set to approx. 2 sec.
- JUMPER is only set on a single pin downtime approx. 5 sec.

Default setting is approx. 2 sec. (pins are bridged by JUMPER) and recommended for operation allowing rather limited visibility of the model (e. g. in lakes). If used in pools the downtime can be set to 5 sec., as interruption of transmitter signal is mainly caused by the construction of the pool itself and risk of losing the boat is basically zero.

As soon as transmitter signal is picked-up again the system will return to the functional mode given at that time. Therefore, the model might not resurface fully if the submerge mode is still activated by the transmitter.

VOLT: Battery Monitor

An additional safety feature of the Tmax is the integrated Battery Monitor. This device permanently verifies adequate power supply of the main battery for safe operation of the boat.
Threshold voltage for 6 Volt system is preset to approx. 4 Volt, for 12 Volt systems to approx. 9 Volt. Threshold voltage can be adjusted via the potentiometer on board of the Tmax. However, a regulated power supply is recommended to achieve an exact setting.

- potentiometer turned clockwise threshold voltage is decreased
- potentiometer turned anti-clockwise threshold voltage is increased

With the voltage dropping below the preset threshold value, the piston tanks will start to press water out of the cylinders. If this is the case, the bow-sided tank will start to press out ballast water first. After a pause of about 15 sec. the stern tank will start to empty. This sequence is to minimize the strain on the already weakened battery pack. After a low battery voltage has been identified further operation of the system will only be possible after the battery pack has been fully charged.

The second green LED [LED6] serves as monitor-LED for optical evaluation of remaining main battery voltage. Furthermore, LED6 facilitates adjustment of threshold voltage via the potentiometer of the battery monitor. The darker LED6, the lower main battery voltage (relative to threshold value).

FUSE

The Tmax is fitted with a 10 A fuse (slow-blow) for protection of its operational circuit due to overload - but NOT against reverse polarity! An overload may be caused by a blocked motor (i. e. by incorrect polarity) or a blocked cog wheel. The latter is unlikely but after years in service not impossible (see "Maintenance" section).

The unit is supplied with a spare fuse. Refrain from using a fuse with a higher load than 10 Amp. Fuse should be a slow-blow (delay-action, item no. 5525 set of 2) type in order to absorb a possible higher starting current without instantly blowing.

During setup a blown fuse is a clear indication for incorrect wiring of switch unit and Piston Tanks. The logical setup of the Tmax will never cause the fuse to blow. Therefore, DOUBLE CHECK wiring before initial operation.

MAINTENANCE

ENGEL Piston Tanks are superior to other designs also in terms of resilience to pollution.
Even slush will not cause a malfunction of the tank as all material drawn into the tank will eventually be discharged.

Standard servicing of the Piston Tank only requires lubrication of the middle cog wheel's retaining bolt with white oil (as used for fire arms or sewing machines). BALLISTOL Oil (item no. 9720) is ideal for this. Just place a drop between the bolt head and the cog wheel. After several turns the lubricant will be sucked-in by itself.

After operation in polluted water (e. g. algae) the piston tanks should be rinsed with fresh water. Please note, that further lubrication of piston is only necessary, if a leakage of the Piston Tank itself is obvious. This might be the case if used in very sandy waters after a period of time. In this (very unlikely) circumstance, open the tank (unscrew at motor/gear cap), rinse the cylinder and lubricate piston and inner spindle with a high performance grease such as Q-Lube (recommended, item no. 9705) or a similar dedicated lubricant.

All components should be fastened inside the WTC with screws or should at least be taped. It is not advisable to glue any of the components in place, especially the Piston Tanks. If the tanks are glued in with Polyester, Epoxy etc. it is very likely that the cylinder will deform and therefore cause a defect of the Piston Tank's mechanism.

Radio interference in model submarines is a common problem, due to the limited space and normally unfavourable arrangement of the receiver antenna. Therefore, all power leads should be positioned as far away as possible from the receiver and the antenna wire. Take special care of wires [J1] and [J2] leading from the switch unit to the potentiometers on the Piston Tanks. These cables are also interference-prone and should, therefore, be installed as far away as possible from any other leads.
In addition, all motor housings of the model (including main drive motors) should be grounded through leads connecting to the negative (-) pole of the main battery. This will further decrease probability of radio interference.

A further effective method for limiting radio interference is the use of ferrite rings (item no. 5800-14 or 5800-17) or clamp ferrites (item no. 5803-35 or 5803-50).

FURTHER SAFETY GUIDELINES

Only operate Piston Tanks when switch unit is completely connected. Otherwise Piston Tanks will inevitably be damaged, resulting in total failure of the system.

Take care when charging batteries!
Batteries which indicate to be sealed can also release gas even if handled and charged correctly (for example: too high a charging current, or excessive charge time, or unsuitable charger in use). Batteries have a security valve to release any possible internal over-pressure. The gas produced is highly explosive and has an enormous destructive power.

For safety reasons batteries MUST NEVER be charged within a sealed compartment!

The charger and the battery should be in an open well-ventilated space. Therefore, ALL batteries must be removed from the hull during the charging period. Even so-called "sealed" batteries allow a build-up of hydrogen gas while being charged which in turn can cause a serious EXPLOSION, tearing the model into pieces and endangering its immediate environment.

Installation of charging sockets in either the hull or pressure proof compartment will result in the GUARANTEE being NULL and VOID!

If you have any questions please do not hesitate to contact us by

phone at int.+49-7043-93520 [Mon.-Fr. 9am - 5pm CET*]
or
email: info@engel-modellbau.de

Happy Sailings!

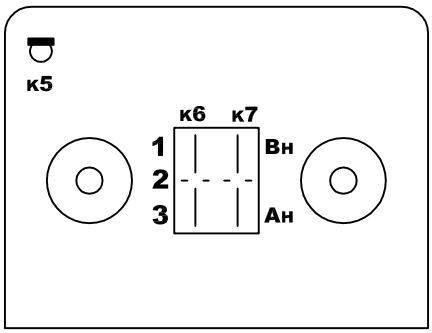
ALEXANDER ENGEL KG

*CET-Central European Time

Problems, possible causes and solutions

Problem	Description	Cause	Solution
When switching to FILL piston rod spins INWARDS, switching to EMPTY piston rod spins OUTWARDS.	Piston might block if moved to far over its ultimate end position.	Wrong polarity of motor.	Change direction of motor rotation by exchanging the wires soldered directly to the motor tags.
	End switches of Piston Tank react not analogously. Piston might block.	Wrong connection of end switches or switch unit.	Verify wiring!
Dive system does not react to FILL command.	**LED5** blinks continuously (permanent blinking). **LED6** is faint or does not glow at all.	Main drive battery not connected to switch unit or voltage already lower than threshold voltage of battery monitor when powering the system. FILL command disabled due to assumed weakness of main drive battery.	Pay attention to correct sequence when powering activating the system: 1. Switch ON transmitter 2. Switch ON main battery 3. Switch ON receiver
Dive system does not react to FILL command ANY MORE.	**LED5** blinks continuously (permanent blinking). **LED6** is faint or does not glow at all.	Battery voltage has fallen below threshold value of battery monitor. FILL command disabled due to identified weakness of main drive battery.	Charge battery.
	LED5 blinks continuously when operating Piston Tanks. **LED6** is bright but faint or off when operating Piston Tanks. **Main drive battery is fully charged!**	Battery voltage is lower than threshold value of battery monitor. FILL command deactivated due to assumed weakness of battery. Threshold voltage is too high.	Lower threshold value by slowly turning potentiometer of battery monitor a small step in CLOCKWISE direction.
	LED5 flashes in groups of four.	When submerging (filling of Piston Tanks) the overpressure compressed within the hull escapes through a leakage. If pressure loss becomes imminent, submerge mode is disabled by pressure switch and Piston Tanks are automatically set to EMPTY.	Open breather so that pressure within WTC is equalized to normal atmosphere. Allocate leakage and seal accordingly.
		Significant difference between air and water temperature creates an under-pressure within the WTC. Submerge command disables by pressure switch.	Open breather so that pressure within WTC is equalised to normal atmosphere.
	LED5 is ON.	Transmitter not powered or defective so that no signal can be received.	Check transmitter and transmitter battery.
Dive system does not react at all.	**LED1** to **LED4** of relais do not light up when switching Piston Tanks to FILL or EMPTY. **LED5** blinks continuously. **LED6** is OFF.	Fuse has blown due to mechanical overload of Piston Tank(s).	Ensure free movement of Piston Tank drive and spindle. Replace fuse (10 A, slow blow).
Water within WTC!	Condensation within WTC.	Difference between air and water temperature leads to condensation of humidity within WTC, mainly on metal parts.	Open WTC until fully dehumidified.
	Piston Tank is leaking. Water is discharged through bearing plate of Piston Tank (possible but very unlikely).	Piston is leaking due to intake of large amount of sand or other rough particles. Piston is worn.	Unscrew bearing plate (to which gears and motor are attached), clean piston and cylinder, grease piston or replace. Refer to manual for "Maintenance".

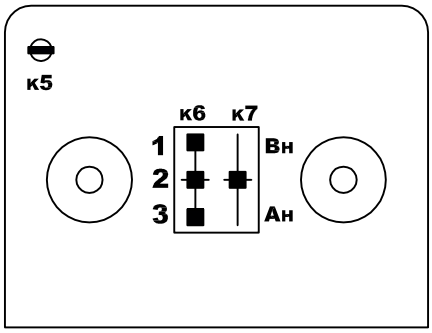
Tmax Transmitter Setup



Model is fully surfaced (to water line):

Slider switches K6 und K7 have no function.

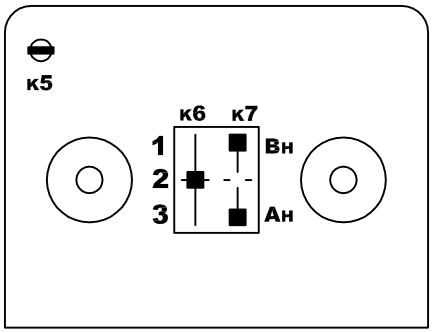
PLEASE NOTE:
Transmitter setup is **exemplary**. K5/K6/K7 must not necessarily correspond to allocation of channels on your transmitter.
However, all 3 channels K5/K6/K7 must be operated via "genuine" proportional channels, NOT via a switch module (e.g. Multi Switch)



Model is submerged and on "even keel" (K5 and K7 centered).

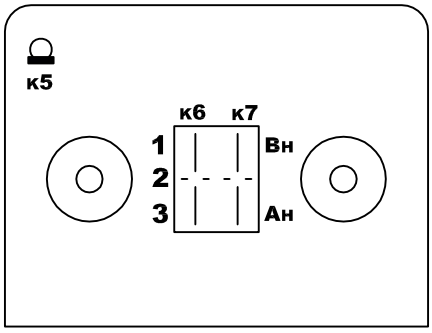
Fine trimming via K6:
- **Pos. 1 = positive buoyancy**
- **Pos. 2 = neutral buoyancy (manual)**
- **Pos. 3 = parked on ground**

In Pos. 1 and 2 model can be trimmed via K7.

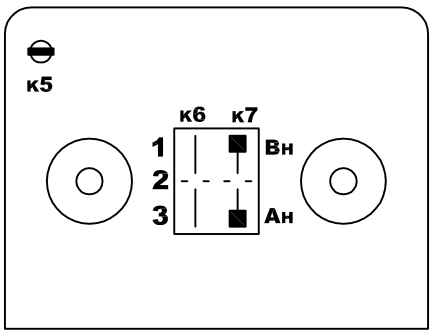


Model is submerged and in neutral buoyancy (K5 and K6 centered):
Bow or stern heavy via K7:
- **BH: bow-heavy**
- **AH: aft-heavy**

Model can be trimmed in both modes via K6.



Model is "parked on ground".
If "ground" is deeper than approx. 1.8 meters the resurface mode will automatically be activated by Pressure Switch.



Actuation of "Static Depth Controller" TAES (optional):
With supplementary switch board TAES connected to Tmax, and switch K5 switched back from "parked on ground" to centred (neutral) position, the model will oscillate to "neutral bouyancy". The stroke of the submerged model in TAES mode depends mainly on its basic trim, meaning that the better the manual trim, the less stroke (up and down movement) during TAES mode. With slider K6 model can still be fine trimmed and trimmed bow or aft heavy via K7. The TAES mode can easily be terminated by short actuation of K5 (upwards).


Engel