Installation guide and users-manual of the Pod- and Schottelsteering

SST1

Thank you very much for choosing our Pod- and Schottelsteering SST1.
Please read the entire user's manual carefully prior installing and using the device.
This user's manual contains important safety instructions, detailed information about fitting,
parameterization and operation of the SST1 steering.
You will recognize even the steps are complicate in reading will work out pretty simple as we have
concentrated on practicality during engineering.
If you face any additional question about the initial installation, the parameterization or the operation
please view our videos at www.imth.de or contact us.

This user's manual is part of the product. Please keep it safely and in case of forwarding the product to
a third party, please make sure the user´s manual goes with it.
Any non-observance of this user manual or the safety regulations will result in void of warranty.

Continuous improvement is driving our work. Therefore scope of delivery in form, function, design and
technical ability might be subject of change.
Please be aware that no claims can be derived out of any pictures, given information, descriptions and
drawings.

Delivery contents:

1 x user manual
1 x PCB SST1 (Basic or Extended)
1 x disc Magnet

Safety:

The SST1 PCB is designed to operate in models of ships and is only allowed to be used in that way.
Use this device only within the given specification (see table of specification).
Store and use the SST1 steering only in a dry environment.
Any mechanical- or electrical change to the steering or exceed of the specification will result in
immediate loss of any warranty against the manufacturer.
Any damage to the guarantee seal on the bottom result in immediate loss of warranty also.

Swallowing a magnet can lead to life-menacing complications, in particular if more than one magnet
was swallowed. In this case contact immediately a doctor.

Pay special attention of running in "Master-Slave" mode is more unsafe. You should only operate this
mode in a safe environment. More details are under "Master-Slave Mode" at page 11 of this manual.

Check the correct operation and function of the steering out of the water prior any ride.

Specification:

Voltage:	5,5 - 10,0 V
Operating Power:	ca. 30 mA at 6,0 V
Max. Power:	1,0 A
Impulse In:	< 5,5 V
Impulse Out:	ca. 5,0 V
Weight:	ca. 15g
Size (BxTxH):	80 x 40 x 12 mm
Operating Temperature:	0 - 40 ºC
Demanding Channels:	2

Introduction:

Different ways of steering are common in navigation. Also one is named Pod-propulsion and offered by different manufacturers.
All of them have one thing common: The Pods are able to run a full circle with no limit in turn.

As the direction to move the propeller keeps always the same, you only achieve a change of direction by turning the propeller half a circle.
The benefits of such engines are not only the ability in exact maneuvering.

The available Servos and remote controls are not able to provide such realistic steering, because the Servos are limited with no endless turn.
You overcome this boundary with your SST1 steering first time. Maneuvering your model ship absolutely as real is now possible with standard model components.

After fitting the SST1 and accompanying mechanical and electrical adjustments, you need to align the SST1 to your remote control and pod. This parameterization only need to be done once, as all settings will be saved. The settings are available to upload at next restart.

Basic requirements to use the SST1:

To enable your ship for realistic steering with the SST1 your model needs to provide following two basic properties:

1.) Your pods can show a 360° electrical turn without the given turn limit.

You have two options to achieve this requirement:

- You choose a Servo (Graupner C 5191 / Art.-No. 5133) and remove the turn limitation. Doing so you achieve a single unit including speed control, engine and gear in one housing.
- A speed control directs an engine in both directions. This engine is linked to a gear and achieves an alternative turn of the pod **(Standstill by ca. 1,5 ms)**.

The recommended the Servo option, to simply remove the turn limitation and keep using the professionally built combination of speed control, engine and gear is shown in an example video on www.imth.de.

2.) The actual position of the pod needs to be recorded by a sensor, which is directly on the SST1 board.
The sensor uses a magnet to record the position of the pod without touching it. The magnet moves analogously to the pod above the sensor and must rotate centrically above the sensor.
If the pod carries a full circle the magnet needs to do the same!
Right now it is uncritical if the direction of both turns are synchronic or opposite. Important is the analogy of the two turns to provide a 1:1 **exact** balance of magnet to pod.

Mechanical Installation:

As you already read the revolving magnet needs to be installed above the sensor.
The sensor is located in the middle of the SST1 in the smaller part of the pcb, which is separated from the main part by the dotted line.
The magnet needs to be installed centered above the sensor with a distance of 0.5 to 1.5mm.

For your easier installation we have provided 4 holes around the sensor. The sensor is installed in the center of these 4 holes. For further easy identification you will find a cross on the backside of the pcb, which also identifies the center.
As better you place the magnet as more accurate the sensor will recognize the angle of the pod and more exact you can run it.

If the SST1 dimensions are too big, you might separate the sensor part from the main pcb at this dotted line and reconnect the two parts with 5 wires.
Connection 1 to connection 1 and so force of the row X3 and X4. The connection shouldn´t be longer than 10 cm.

Attention: You will lose the warranty carrying out this action.
Of course we will service you if needed also in this case.
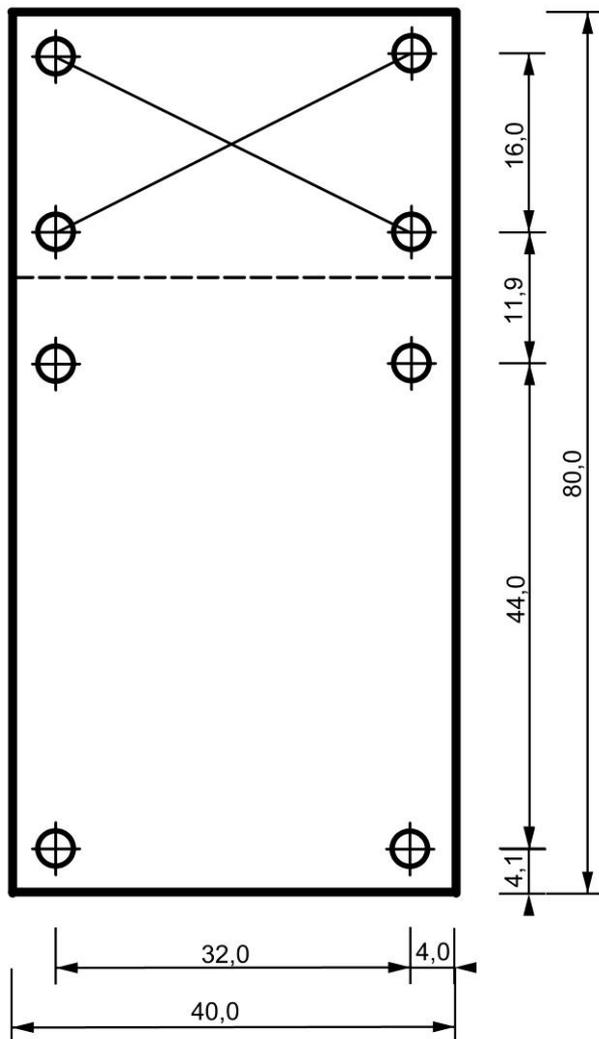
Electrical Installation:

For a safe use the pcb needs unshielded DC of 5.5 – 10.0 Volts, which have to be connected to the headers X1 and X2
Pay attention that all (+) connections within the SST1 are connected with each other as well as all (-) connections.
With a DC of 5.5 to 10.0 Volts you should be able to connect the servo and the speed control to the header X2 directly only if the power carries less than 1.0 Ampere. Pay attention to the max operating Power.
In the case the DC is higher 6.0 V, normally most servos are not capable. In this case you have to disconnect the (+) to the servo or the speed control and reconnect to a suitable power support.
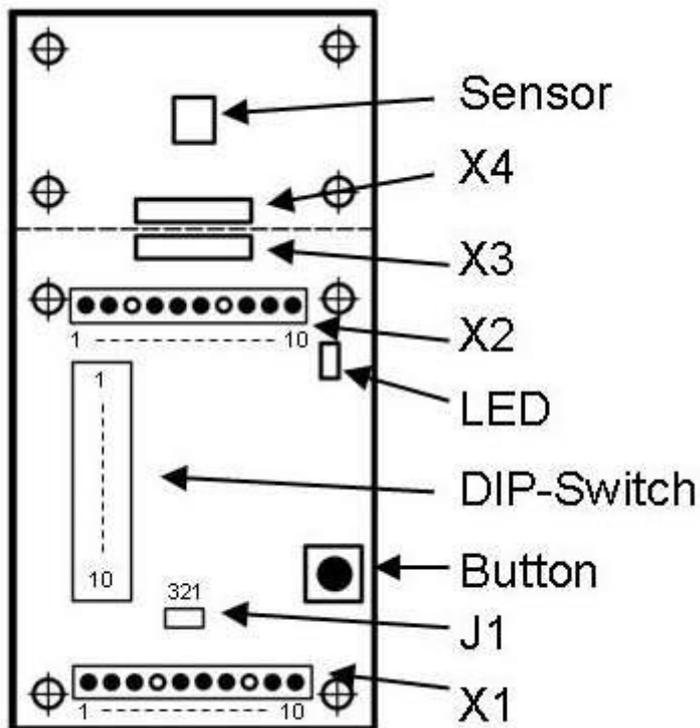
On the pulse inputs it is allowed to have max 5V only. This will normally be the case if you have a direct connection from the receiver to the SST1.
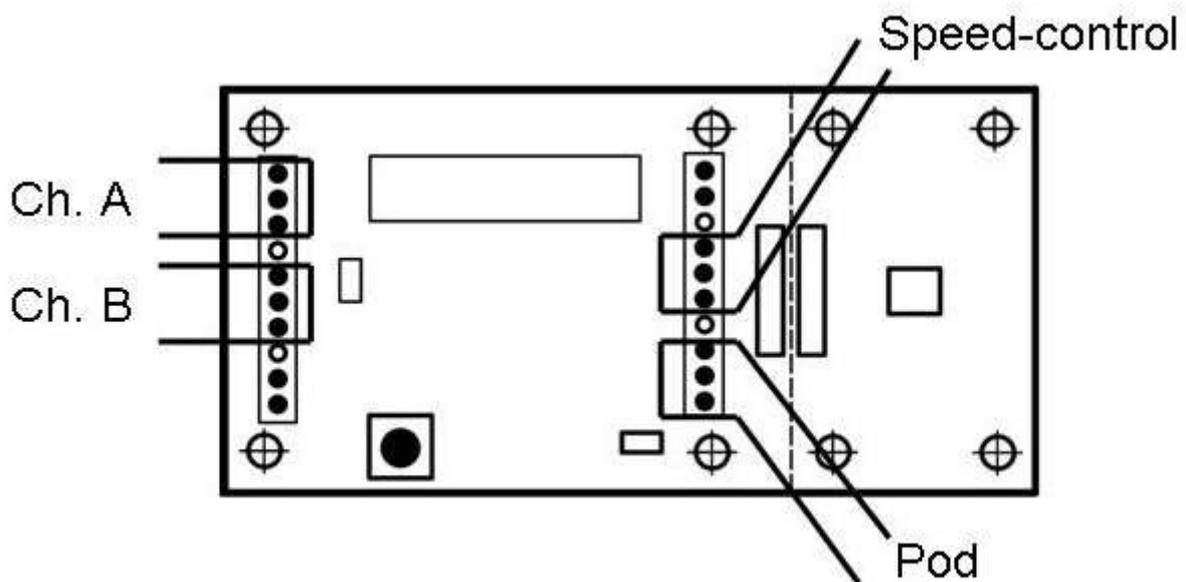You can run the SST1 with 5V also. To do so, you have to place a solder bridge und cut a small trace.

Attention: Following the modification some safety precautions will be overridden and you will lose the warranty.
Best if you use a BEC module providing 5.5 V to run the steering in this case. In any case the operating power exceeds 5.5 V the steering will be destroyed.
If you still want to modify, cut the existing bridge at J1 between 2 +3 and solder a new fine bridge from 1 to 2.

X1

Pin	Signal	
1	⊓	
2	+	Channel A
3	−	
4	not connected	
5	⊓	
6	+	Channel B
7	−	
8	not connected	
9	TxD	
10	(Reset)	

X2

Pin	Signal	
1	Slave	
2	RxD	
3	not connected	
4	−	
5	+	Speed-contol
6	⊓	
7	not connected	
8	−	
9	+	Pod
10	⊓	

Ch. A

Ch. B

Speed-control

Pod

First Use and parameterization:

Now the fun starts.
Prior the initial operation please double check again ports, right order of connections and mechanical structure.

From the release 3.0 you can use all electronic speed controller (ESC), which have a neutral position by 1,0 or 1,5 ms.
With the DIP of counters 10 you inform during the parametrization which ESC type you use.
When using an ESC, which is approx. 1.0 ms in the neutral or neutral position, switch the DIP switch 10 to ON before parameterization.
If you are using ESC with a neutral position of approx. 1.5 ms, turn the DIP 10 OFF.
The DIP 10 takes on another function after the parameterization!

Start on the remote control to set the trim to zero as well as all DIP-switches to OFF on the SST1 steering with the exception of DIP 4, which you set to ON. This will restrain the tolerances of the remote control slightly.
The DIP 10 remains of course the same as you have set it before.

The actual parameterization process is carried out exclusively via the joystick, the sequence of which is shown in the table below.
The resulting values are stored automatically on the SST1 and are available again at the next start. The parameterization must therefore only be carried out once or after every change to the existing components.
Prior you have to know the direction of the pod in relation to the magnet. Is it running the same or opposite direction?
In case the direction is synchronic to the magnet please remember "right" otherwise "left", which you will need in step 3.

Any mistake during the parameterization will be shown by the LED flashing for 3 seconds. The process will be canceled. Various occasions might cause this. Please read the section "Faults and possible reasons" further to the end of the manual.

Switch on the remote control, receiver and all necessary power supplies. If you start the parameterization the first time, neither the pod nor the engine should move.
Now we really start:
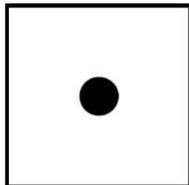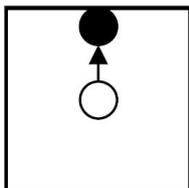
|	
Step 1:	Place the joystick to the middle or neutral position. Press the button for 3 seconds until the LED starts flashing slowly. When using a copilot attachment, turn the attachment at least one turn during the step with the throttle lever back. Briefly press the button, then the LED flashes faster and you go to the next step.
Step 2:	Push the joystick to the straight drive position. You might choose a different position as shown but only in 90° raster. Leave the joystick or copilot in this position and then press the button briefly. The LED slows down again and move on to step 3.

Step 3:
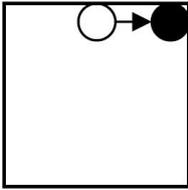
Now you will decide the direction of your pods turn. If you remember "right", move the joystick / copilot to the right, place and keep it in and press the button.
For models with the "left" direction, move the joystick / copilot to the opposite position (top left).

Press the button and the LED flashes faster.

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Step 4:
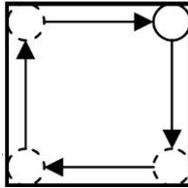
Run through every single endpoint of the joystick / copilot. It doesn't matter if you take this action clockwise or counterclockwise.

Once finished let the joystick / joystick go back and stay in neutral position. Press the button, the LED flashes slower.
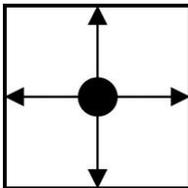
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Step 5:

During this step the LED is on constantly. The steering detects some settings of the Pod automatically, usually less than 10 seconds.

After the settings have been detected the Pod speed goes considerably slower (depending on the installed servo to zero).

Then the LED will start flashing again in slow rhythm and you can go to the next step.

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Step 6:

Now you have to stop the Pod / Servo by using the joystick. To do so you have to move the joystick in one of the 90 degree positions. While doing this you will recognize the Pod is going faster or slower. In case the Pod goes faster you need to move the joystick to the opposite position.
Once the servo is not turning **and** also not changing the position of the Pod (the Servo is also not allowed to make a noise), press the button and continue with the next step, please.

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Step 7:

The LED flashes slowly now.
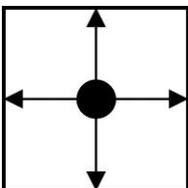
Now the pod has to be aligned to its straight-ahead exit.

Refer to step 6 and bring the Pod to run straight using the joystick. Alternatively you might use your hand to turn the Pod to straight drive position.
As soon as the Pod is aligned on straight forward, press the button briefly.

The LED stops flashing now and the propeller confirm the successful parameterization showing a threefold short run.

You have now achieved all steps of the initial parameterization and might try out the steering and check out further settings using the DIP-switches.

<u>DIP-Switch:</u>

The SST1 includes 10 DIP-switches, which you might use to set the steering towards your personal favor. The following table shows an overview of the potential settings. Before we like to take the opportunity to describe the single parameters in detail:

Turnout speed: Using DIP 1and 2 you can change the turnout speed of the Pods.

Straight: With DIP 3 you can set if the Pod goes automatically in the degree for straight drive in case the joystick is in neutral position - or it stays in the degree lastly set by the joystick.

Zero-position: With DIP 4 and 5 you are able to choose 1 out of 4 different sized areas around the neutral position of the joystick just to allow smaller movements of the joystick will not affect the Pod and suppressing minor fluctuations of the remote control signal. This is shown as (N) in the drawing.

Turn without drive: Here again you have an area of tolerance (D), which you can choose out of 4 scales. Within this area the Pod will be able to turn without the Pod starts driving. The propeller starts driving when the joystick gets out of area N and D, only.

In this area of tolerance you have to pay attention to following:
As larger you make this area as smaller gets the remaining way from starting to reach full speed. With a smaller way the speed is harder to adjust.
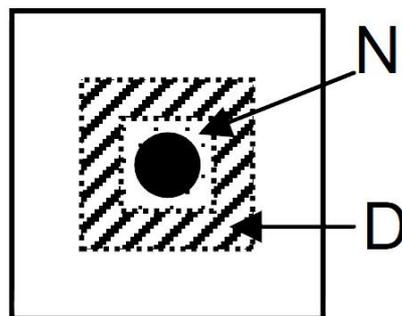
Drive speed: Again you have 4 options using DIP 8, 9 and 10 to reduce the maximum speed of the propeller.

Attention:
DIP 10 is only used during parameterization to select the ESC type !!

DIP switches

turnout speed

DIP 1	DIP 2	Range
OFF	OFF	fast
ON	OFF	↓
OFF	ON	
ON	ON	slow

headway

DIP 3	Range
ON / OFF	autom. headway

zero-point

DIP 4	DIP 5	Range
OFF	OFF	small
ON	OFF	↓
OFF	ON	
ON	ON	large

without engine

DIP 6	DIP 7	Range
OFF	OFF	small
ON	OFF	↓
OFF	ON	
ON	ON	large

maximum speed

DIP 8	DIP 9	DIP 10	Range
OFF	OFF	OFF	100%
ON	OFF	OFF	90%
OFF	ON	OFF	80%
ON	ON	OFF	70%
OFF	OFF	ON	60%
ON	OFF	ON	50%
OFF	ON	ON	40%
ON	ON	ON	30%

type of speedcontroller

DIP 10	Range
ON / OFF	ON = Flight controller (1,0 ms neutral position)

short instruction

To achive a realistic behaviour the Speed of the Pod can be reduced.

In neutral position the Pod will run straight automatically.

Area of tolerance around the neutral position to balance smaller fluctuations of the remote control.

Within this area of tolerance the Pod can be moved around without the engine starts.

The maximum spees can be reduce down to 30%

Only during parameterization (otherwise maximum speed)

Master-Slave Mode:

In case you are using two of the SST1 steering, you have the option to handover the settings of the Master to the slave. To enable both steering have to parameterize first.
In Master-Slave-Mode the slave will try to align the Pod analog to the Master. You will run the master and the slave with the same joystick.

This mode is useful if you do not need to maneuver exactly or run your model by one joystick only. The unused joystick you might use for other functions simultaneously.

You have to consider the negative side of this mode first:
The Master is sending data to the slave by a wire. Normally this causes no issues and the slave receives the data safely. Due to the way of transfer external influences might cause disruption and create data mismatch resulting in unexpected reactions of your model. Please operate in Master-Slave-Mode when any danger can be excluded, only.

Enter in Master-Slave-Mode only when master and slave have been connected with the data transfer wire and both have been operating at least 5 seconds without relation.

In case data transmission gets lost in Master-Slave-Mode the slave will hold and keep the data received latest – **the failsafe function is disabled in this mode.** It might occur that your model keeps going with full power.
Run in Master-Slave-Mode only when you are able to exclude any danger or damage.

For data transmission a wire from Master (X1 / 9) to Slave (X2 / 2) needs to be maintained. The Master-Slave-Mode will be switched on through the connection (X2/ 1) using a wire, which is connected to ground (-).

In case the slave moves opposite to the master, exchange the 2 wires between the receiver and the master and parameterize the Master again.

Wire to switch on the Master-Slave-Mode

Data transmission wire
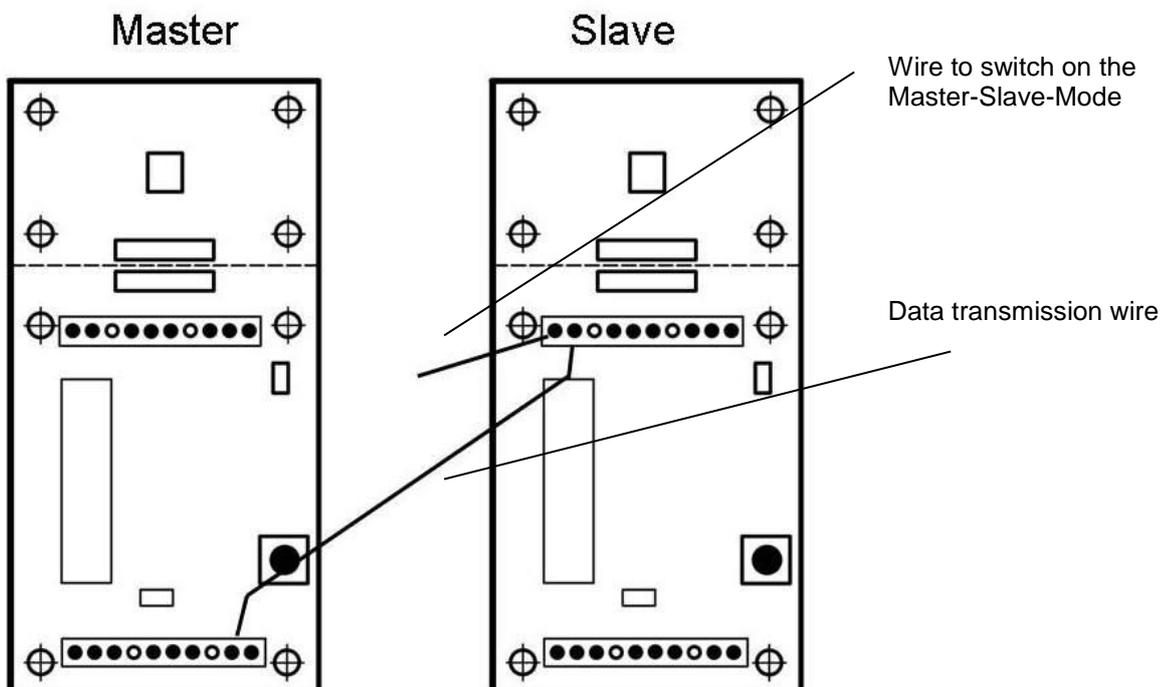
Resetting the stored values to the factory setting:

The entered parameters are saved internally after each complete parameterization.
This means that you only need to parameterize the controller once or if you have changed something mechanically or want to optimize the parameters.
In order to reset the parameters completely to the factory settings, press and hold the button for approx. 5 seconds. Then the LED starts flashing fast. This is the sign that all parameters have been reset to the factory default.
The next time you turn on, you will notice that your SST1 is behaving as new.

Failures and possible root causes:

LED is flashing during parameterization	Magnet is not close enough to sensor Remote control were not detected The Joystick is not set correctly
LED flashes inconsistent	Magnet is not close enough tot he sensor.
The Pod turns in the wrong direction after parameterization	The direction has been set incorrect during (see Step 3).
The Pod turns slowly in 1 direction	Potentially during Step 6 you have set the servo not precise enough for the turning – the servo is not allowed to give any noise (even hum or buzz) nor trying to find another position.

Firmware Update:

Constantly we are working on improvements of our products. This might result in enhancements of the software, i.e. to integrate new functions or even safer operation.
Always we will deliver product with the latest software.

In case your steering carries older software, feel free to send it to us for an update. You will find further information for available updates at www.imth.de or contact us at service@imth.de or
+49 (40) 67 38 05 27

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Environment:

This symbol shown on the product states that it is not allowed wasting the product through standard waste systems.
You have to return it for recycling at a collecting point for electrical and electronical devices. Materials are signed to be reusable. Recycling will provide an important impact o safe the environment. Please contact your local community to learn about the collecting point.

SST1-Extended - Programming for Copilots - step by step V3.0

		Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
LED	off	slowly flashing	faster flashing	slowly flashing	faster flashing	on	slowly flashing	faster flashing
Press Button S2	(long press)							
Pod	–	–	–	–	–	↻↻	↻↻	↻↻
Pro-pulsion	–	–	–	–	–	↻↻	↻↻	↻↻
length of time	> 3 sec.	until you press the button	until you press the button	until you press the button	until you press the button	(mostly < 10 sec.)	until you press the button	until you press the button
what to do	press the button until the LED starts to flash	rotating the Copilot through 360 degrees - lever in center posistion	move the lever into forward motion	move the Copilot to the right (left) position **	rotating the Copilot through 360 degrees	automatic step - move the lever in the center position	bring the pod to standstill - therefore move to left or right position*	bring the pod on headway - therefore move to left or right position

* see instruction manuel

SST1 (Basic + Extended) - Programming - step by step V3.0

		Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
LED	off	slowly flashing	faster flashing	slowly flashing	faster flashing	on	slowly flashing	faster flashing
Press Button S2	(long press)							
Pod	—	—	—	—	—	↻	↻	↻
Pro-pulsion	—	—	—	—	—	↻	↻	↻
length of time	> 3 sec.	until you press the button	until you press the button	until you press the button	until you press the button	(mostly < 10 sec.)	until you press the button	until you press the button
what to do	press the button until the LED starts to flash	let the joystick in the center-position	move the joystick into forward motion	move the joystick to the right (left) position *	go to all mechanical end stops	automatic step - move the lever in the center position	bring the pod to standstill - therefore move to left or right position *	bring the pod on headway - therefore move to left or right position

* see instruction manuel

CE

Konformitätserklärung

Der Unterzeichner, der den nachstehenden Hersteller vertritt,

IMT Innovative Modell Technik Hamburg
Pezolddamm 127a in 22175 Hamburg

erklärt hiermit, dass das Produkt

Pod- und Schottelsteuerung SST1

in Übereinstimmung mit dem nachstehenden EN-Standard

DIN EN 55014-1

ist.

Hamburg, 28.02.2013

Jürgen Hartwig, Inhaber

Own notes: