

# USER GUIDE

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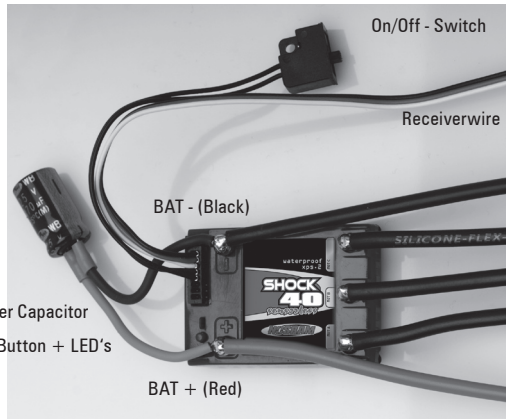
**#96500**  
BRUSHLESS  
SENSORLESS DESIGN  
MICRO CAR SPECIALIST

**SHOCK**  
**40**  
sensorless

for distributor address see packaging

[www.nosram.com](http://www.nosram.com)

## 1. CONNECTIONS



### RX-/SWITCH HARNESS:

This NOSRAM speed-control is equipped with the new RX-/Switch-Harness for maximum convenience. The regular NOSRAM Multicon receiver wire is used and will easily fit in all ordinary receivers. Install the On/Off micro switch using supplied doubled-sided tape.

### POWER WIRES:

1.5mm<sup>2</sup> power wires without any attached connectors are used. There are G3.5 gold connectors included which allow convenient installation with brushless motors such as the Storm Evolution Micro 370. The unique solder posts allow easy and convenient replacement of the power wires. Nevertheless some soldering skills are required. Avoid soldering longer than 5sec per soldering joint to prevent possible damage to the speed-control due to overheating of the components!

## 2. INSTALLATION

The **Shock 40** is supplied with 1.5mm<sup>2</sup> power-wires without attached connectors. There are G3.5 gold connectors included which allow convenient installation with brushless motors such as the Storm Evolution Micro 370. Be careful with the correct wire sequence/colors since an incorrect connection may damage the speed-control! Isolate all connections carefully.

**Caution:** Avoid soldering longer than 5sec per soldering joint when replacing the power wires on the speed-control and motor to prevent possible damage due to overheating of the components!

- Attach switch-/RX-wire harness to speedo (be careful with correct polarity)
- Connect the speed-control to the receiver (position: Channel 2)

### Brushless Motor

- Speedo MOT.A - Motor „A“
- Speedo MOT.B Motor „B“
- Speedo MOT.C Motor „C“

### Brushed Motor:

- Speedo MOT.A (blue) and MOT.B (yellow) will be the combined „minus“ on brushed motor.
- Speedo MOT.C (orange) is the „plus“ on brushed motor.

- Doublecheck all connections before connecting the speed-control to a battery.

**CAUTION:** If battery is connected with reversed polarity it will destroy your speed-control!

- Red power-wire - Speedo „+“ to battery „Plus“
- Black power-wire - Speedo „-“ to battery „Minus“

- The speed-control is now ready to be set-up (see section 5).

## 3. USAGE TIPS

- Position the speed-control and capacitor where they are protected in the event of a crash and gives you easy access to the connectors and button.
- Make sure there is enough clearance between the speed-control, power-wires, antenna and receiver. Avoid any direct contact between power components, the receiver or the antenna as this can cause interference. If interference occurs, position the components at a different place in the model.
- Mount the speedo and capacitor using the supplied thick/black doubled-sided tape.
- The aerial should be run vertically up and away from the receiver. Avoid contact with any parts made of carbon fibre or metal. If the aerial is too long, don't coil up the excess length. See also the instructions supplied with your radio control system.
- Because of the physical principles of brushless technology, the speed-controls do get a little hotter than brushed systems. Therefore it is required to let the speed-control cool down completely after every run.
- Sensorless brushless motors do not have a designated rotating direction and work identically in both directions. If the motor rotates the wrong way for your model, after you have wired up the three phase wires, then you can simply change motor rotation direction by swapping two of the three phase wires (e.g. SpeedoA goes to MotorB and SpeedoB goes to MotorA)!



The crossed-out wheeled bin means that within the European Union the product must be taken to separate collection at the product end-of-life. Do not dispose of these products as unsorted municipal waste.

Dear Customer,

thank you for your trust in this NOSRAM product. By purchasing the **NOSRAM Shock 40** speed-control, you have chosen one of the most advanced sensorless brushless speed-controls of today. The Shock 40, with all of its high-tech features and specially selected electronic components, is one of the best speed-controls currently available:

- Brushless und Brushed
- Micro Car Specialist
- 8 xps.2 Power Profiles
- Smart-Temp-Readout System 2
- 3-way Protection System
- Sensorloses Design
- Smallest dimensions, low weight
- Smart-Cell System (NiMH 4-9 / LiPo 2S + 3S)
- Freeze Drive Design
- Waterproof

Please read the following instructions carefully before you start using your NOSRAM Shock 40 speed control. This user guide contains important notes for the safety, the use and the maintenance of this product. Thus protecting yourself and avoid damages of the product.

Proceed according to the user guide in order to understand your **NOSRAM Shock 40** speed control better. Please take your time as you will have much more joy with your product if you know it exactly.

This user manual shall be kept in a safe place. If another customer is using this product, this manual has to be handed out together with it.

## 4. SPECIFICATIONS

Brushless + Brushed	yes
Sensorless Brushless System	yes
Forward / Brake	yes
Forward / Brake/ Reverse	yes
Case Size	28.5 x 40.3mm
Weight (excl. wires)	20g
Voltage Input	4.8 - 11.1V
	BRUSHLESS BRUSHED
Typ. Voltage Drop* @20A	0.026V / phase 0.019V
Rated Current*	382A / phase 382A
Rec. Motor Limit (370/380 size)	none none
Rec. Motor Limit (540 size)	over 7.5 turns over 13T

B.E.C.	6.0V / 2.0A
Smart-Temp-Readout System 2	yes
High Frequency	yes
Fail-Safe-System	yes
3 Way-Protection-System	yes
Waterproof	yes
Integrated Solder Posts	yes
Power Wires	1.5mm <sup>2</sup>
3.5mm Gold Connector	include
4 adj. Mode's (SmartCell, Motor/ Drive-Settings, XPS.2 Powerprofiles, Autobrake)	yes

\* Transistors rating at 25°C junction temperature

Specifications subject to change without notice.

## 5. RADIO / SPEED-CONTROL SET-UP

In setup mode the **Shock 40** stores radio calibrations after completed procedure, all the settings will be stored in the speed-controls memory even if the speed-control will be disconnected from the battery.

### TRANSMITTER SETTINGS

Setup the following basic functions on your transmitter (if available):

Description	other names in radio	Required Setting
Throttle Travel	High ATV, EPA	100%
Brake Travel	Low ATV, EPA, ATL	100%
Throttle Exponential	EXP, EXPO	start with 0
Neutral Trim	SUB Trim	centre
Servo Reverse	Throttle Reverse	any setting, don't change after set-up procedure!

If your transmitter doesn't offer any of above functions, it's already in „basic setup“ mode.

- Ensure that the speed-control is not connected to the drive battery and is switched off.
- Remove motor pinion or ensure that the wheels of the model are free to rotate.
- Switch the transmitter on and set the transmitter throttle stick to neutral.

- Connect the speed-control to the battery (switch in OFF position).
- Hold the button pressed and turn the switch on.  
You entered setup mode and the blue LED flashes (it will flash until the setup is completed).

- Leave transmitter in neutral position and press the button once.  
Neutral setting is stored, yellow/blue LED flashes and the motor beeps.
- Hold full throttle on transmitter and press the button once.  
Full-throttle setting is stored, red/blue LED flashes.
- Hold full brake on transmitter and press the button once.  
Brake setting is stored, red and blue LED's glow..

- This completes the setup procedure, stores all settings, and your **Shock 40** is ready to use.
- If you make a mistake during the setup procedure, don't worry: Disconnect the battery for about 10sec and start again from the first step.
- At the end of each run switch off the car, and then switch off the transmitter.
- At the start of each run switch on the transmitter first, then switch on the car.
- For storage of the car, disconnect the drive battery at all times!

### CHECKING THE FUNCTIONS:

Check the LED's when moving your throttle stick and you will see if everything is setup correctly.

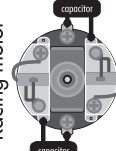
FUNCTION	STATUS	Left LED	Right LED
Neutral (automatic brake inactive)	--	off	blue
Neutral (automatic brake active)	--	red	off
Forward	partial throttle	yellow	off
Forward	full throttle	yellow	blue
Brake	partial brake	red	off
Brake	full brake	red	blue

## 6. SUPPRESSION

Mabuchi motor



Racing motor



**ONLY FOR BRUSHED MOTORS!** Motors with no capacitors or not enough capacitors may interfere with the speed-control. To avoid this, solder the supplied capacitors to your motor (see picture).

## 7. MODE PROGRAMMING

The **Shock40** features 4 modes which enable you to adjust it to YOUR special requirements. The factory settings are shown in grey colour. This is the first NOSRAM speed-control using a single button setup for radio-setup and mode adjustments, therefore it works in a slightly different way than known from NOSRAM speed-controls before but we have retained the simple and intuitive logic from before to make it as user-friendly as possible

- How to get into „programming the modes“? With speedo turned on, press button for 3sec until all 3 LED's flicker twice quickly.
  - How to know in which mode you are? check LED flashing sequence of left LED's.
  - How to check the stored values? Count the number of flashes of the blue LED. (\* = value 1 | \*\* = value 2 | etc.).
  - How to change the value? Press button to increase value by one step.
  - How to get to the next mode? this is done automatic, the values will be shown 3 times before it jumps to the next Mode! The „jump“ to the next mode is indicated by all 3 LED's flickering twice quickly.
  - How to leave the programming mode? simply turn off speedo anytime, the most recent values you had chosen will be stored.
- Table of settings, values and modes: see below (grey-shaded values show „default“ settings“).

**DirectAccess Function:** For maximum convenience we have incorporated the new DirectAccess function which allows you to jump straight to the mode you would like to change without having to go „the long way“ through all the other mode's.

- with speedo turned on, press button and keep pressed (do not release after 3sec!).
- speedo scrolls through the mode's and they are indicated by the LED flashing sequence of the left LED's, blue LED will not flash.
- if you have reached the mode you would like to change (as indicated by left LED's), release button.

The DirectAccess works if you start from the beginning of all mode's, but it also works to jump from Mode.1 straight to Mode.3 for example (simply keep button pressed to activate DirectAccess again!).

**MODE.0 (Smart-Temp-Readout System 2):** This new feature allows you to accurately check if all is running well or if you're close to shutdown already. The higher the number of flashes, the hotter the speedo ran and every flash equals to 5°C temperature decrease

Left LED's	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
OFF	> -45°C > -81°F	-40°C -72°F	-35°C -63°F	-30°C -54°F	-25°C -45°F	-20°C -36°F	-15°C -27°F	-10°C -18°F	-5°C -9°F	Shutdown

**MODE.1 (Smart-Cell System):** we recommend using value 2 for 4-6 cells NiMH racing purposes, which disengages the LiPo protection. With value #1, the Shock 40 automatically detects if a 2S or 3S LiPo is connected and adjusts cut-off accordingly.

Left LED's	#1	#2
Yellow	LiPo/NiMH Automatic	4-Cell NiMH Racing Mode

**MODE.2 (Motor- & Drive Selection):** the **Shock 40** allows you to select from two different drive modes (with or without reverse) and select between brushless and brushed motor operation.

Left LED's	#1	#2	#3	#4
Red	Forward/Brake/Reverse Brushless	Forward/Brake Brushless	Forward/Brake/Reverse Brushed	Forward/Brake Brushed

**MODE.3 (XPS.2 Power Profiles):** allows you to adjust the **Shock 40** to your likes. Either you run on mild or powerful motors or on slippery or high-traction surfaces, we have incorporated a profile for you! Higher value means more overall power and more aggressive throttle response. All settings are available for brushless and brushed motors.

Left LED's	#1	#2	#3	#4	#5	#6	#7	#8
Yellow/Red (alternate)	smooth Power: 1X	smooth Power: 2X	smooth Power: 3X	smooth Power: 4X	linear Power: 4X	linear Power: 5X	progressive Power: 5X	aggressive Power: 6X

**MODE.4 (Automatic Brake):** allows you to set a slight braking action which is applied in the neutral range. This enables you to simulate the feel of a brushed motor and also hold the throttle on longer when entering a turn. For brushed motors you achieve the same natural slowdown as a brushed motor with no autobrake when you set value 1-2.

Left LED's	#0	#1	#2	#3	#4	#5	#6	#7	#8
Yellow/Red (same time)	none	Going from lowest to highest automatic brake setting (value 1 = minimum / value = maximum)							

## REPAIR PROCEDURES / LIMITED WARRANTY

All products from NOSRAM are manufactured according to the highest quality standards. NOSRAM guarantees this product to be free from defects in materials or workmanship for 90 days (non-european countris only) from the original date of purchase verified by sales receipt. This limited warranty doesn't cover defects, which are a result of misuse, improper maintenance, outside interference or mechanical damage.

„This applies among other things on:

- Cut off original power plug or not using reverse polarity protected plugs
- Receiver wire and/or switch wire damaged
- Mechanical damage of the case
- Mechanical damage of electronic components/PCB
- Soldered on the PCB (except on solder posts)
- Connected speed-control with reversed polarity“

To eliminate all other possibilities or improper handling, first check all other components in your model and the trouble shooting guide, if available, before you send in this product for repair. If products are sent in for repair, which do operate perfectly, we have to charge a service fee according to our pricelist.

With sending in this product, the customer has to advise NOSRAM if the product should be repaired in either case. If there is neither a warranty nor guarantee claim, the inspection of the product and the repairs, if necessary, in either case will be charged with a fee at the customers expense according to our price list. A proof of purchase including date of purchase needs to be included. Otherwise, no warranty can be granted. For quick repair- and return service, add your address and detailed description of the malfunction.

If NOSRAM no longer manufactures a returned defective product and we are unable to service it, we shall provide you with a product that has at least the same value from one of the successor series.

The specifications like weight, size and others should be seen as guide values. Due to ongoing technical improvements, which are done in the interest of the product, NOSRAM does not take any responsibility for the accuracy of these specs.

### NOSRAM-Distributor-Service:

- Package your product carefully and include sales receipt and detailed description of malfunction.
- Send parcel to your national NOSRAM distributor.
- Distributor repairs or exchanges the product.
- Shipment back to you usually by COD (cash on delivery), but this is subject to your national NOSRAM distributor's general policy.

## 8. SPECIAL FEATURES

**Sensorless Brushless Design:** Revolutionary NOSRAM software providing sensed driveability even without hall sensors. A quantum leap in sensorless brushless technology!

**XPS.2 Power Profiles:** result in more power and better driveability. Depending on the status of the car (start, acceleration, full speed) the software calculates the perfect motor management by adjusting current limiter, motor timing, throttle curve and more! Higher value means more overall power and aggressive response.

**PMS.3 Brushed - Power Profiles:** The known and world's winning PMS.3. Brushed style power programs have been implemented into the **Shock 40** as well. Higher value means more overall power and aggressive response.

**Smart-Temp-Readout System 2:** the **Shock 40** allows you to read-out the maximum internal temperature that the speedo reached. To store it to the memory, briefly apply brakes after the run before you turn the switch off. You can conveniently read-out the temperature back in the pits since it remains stored until you turn it on the next time regularly (which will reset the memory). This new feature allows you to accurately check if all is running well or if you're close to shutdown already. The higher the number of flashes, the hotter the speedo ran. Thermal shutdown would occur at 10 flashes.

**DirectAccess Function:** For maximum convenience we have incorporated a quick DirectAccess function which allows you to jump straight to the mode you would like to change without having to go „the long way“ through all the other mode's.

**Brake Adjustment:** A good starting point for the brake setting on your radio is 80% for all classes. Make sure you do the radio-setup with all settings on the radio on 100%!

**Smart-Cell System:** Ready for the next battery technology – LiPo batteries! NOSRAM's exclusive and smart Smart Cell System ensures that LiPo batteries can be used safely without accidentally deep-discharging of the cells. Motor power will be reduced (no shutdown will occur!) if the system recognises very low battery voltage. It is self adjusting to 2S or 3S LiPo batteries!

**Waterproof:** Due to latest production technologies and use of HighTech materials, it was possible to make these speed-controls fully waterproof! This material also makes the speed-controls more shock resistant than other similar products. It's no longer needed to seal your speed-control when you are driving in the rain/snow!

But please make sure you still seal your other electronic components (receiver, servo and motor) since these are normally not waterproof and will get damaged due to the water.

**Changing Mode settings without the transmitter:** At race events you usually do not have access to your transmitter, but never mind since you can simply disconnect the receiver lead from the receiver and change the MODE settings as described in section 7 „Mode Programming“.

**Power Capacitor:** Never disconnect the power-capacitor! It offers increased punch and additional protection, it must be connected to BAT+ and BAT- solder posts with shortest possible wires.

**FreezeDrive Design:** NOSRAM's secret FreezeDrive Design results in lower speedo temperature under all racing conditions and for both brushless + brushed. Sorry, no further details to be disclosed. Simply a step ahead of the competition!

**Fail Safe System:** Digital protection against radio interference, "The guardian angel". The safety electronic can detect reception of a "false" or incomplete radio signal, e.g. due to a low transmitter battery or environmental radio interference which reach the model, or if the model is out of the transmitter range. For protection against damage, the speed-control switches to the neutral position, and the model comes to a stop.

**3-way protection system:** The perfect protection against short-circuits (motor), overload and overheating. If your speed-control faces overload, the motor function will be shut-off for protection and the blue LED will flash, although the steering function is maintained. Let the speed-control cool down for a few minutes. If you experience frequent shutdowns, check for the following:

- Correct gear ratio (refer to motor manual for gearing recommendations)
- XPS.2 setting too high (higher value will heat up motor and speed-control excessively)
- Motor is too strong or motor is damaged.

## 9. TROUBLESHOOTING GUIDE

SYMPTOM	CAUSE	REMEDY	
Servo is working, no motor function.	Speed-control plugged in incorrectly	Plug speed-control in Ch 2	
	Overload protection activated	Allow speed-control to cool down	
	Wiring problem	Check wires and connectors	
	Motor defective	Replace motor	
	Speed-control defective	Send in product for repair	
	No servo and no motor function.	Speedo connected to receiver with wrong polarity	Connect speedo with correct polarity
RX-/Switch Harness not plugged in correctly		Connect RX-/Switch-Harness correctly	
Battery defective		Replace with different battery pack	
Crystal defective		Replace components one by one.	
Receiver defective			
Transmitter defective			
Motor stutters while accelerating	Speed-control defective	Send in product for repair	
	Power Capacitor damaged	replace Power Capacitor	
	Radio Interference	Change location of components	
	Motor defective	Replace motor	
	Speed-control defective	Send in product for repair	
	Motor runs in reverse when accelerating forward on the transmitter.	Motor connected for reverse operation	Swap two of the 3 phase wires
BM - Motor connected with reversed polarity		Connect motor correctly	
Transmitter settings changed after set-up		Repeat set-up procedure	
Motor pinion too big or gear ratio too long.		Use smaller motor pinion/shorter gear ratio	
Transmitter settings changed after set-up		Repeat set-up procedure	
Insufficient performance. E.g. poor brake power, topspeed or acceleration..		Power Capacitor damaged	Replace Power Capacitor
	BM - Motor worn out	Maintain motor	
	Motor defective	Replace motor	
	Speed-control defective.	Send in product for repair	
	Speed-control switches off frequently.	Model used too often without cool-down periods	Let speed-control cool down after every run
		Motor stronger than motorlimit or input voltage too high	Use only motors and batteries which are within the specifications of the speed-control
Motor pinion too big (e.g. gear ratio too long)		Use smaller motor pinion/shorter gear ratio	
Stuck drivetrain or ballbearing		Maintain model	
Motor defective		Replace motor	
Motor never stops, runs at constant slow speed		Transmitter settings changed after set-up	Repeat set-up procedure
	Radio interference	Receiver or antenna too close to power wires, motor, battery or speed-control. Receiver aerial too short or coiled up	See „Installation Tips“ and „Installation“
Receiver defective, too sensitive; Transmitter defective, transmitter output power too low, servo problem		Replace components one by one Only use original manufacturers crystals	
Poor battery connection		Check plugs and connecting wires	
Transmitter batteries empty		Replace / recharge transmitter batteries	