

USER MANUAL

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SXX V3.0

Version 2
Firmware ONLY!!!

#80905 & 80955

Brushless Competition
Dual ADPC^{MOD} Power Profiles
TwinBEC 6.0V/3.0A
USB Software Updateability

LRP electronic GmbH
Wilhelm-Enssle-Str. 132-134
73630 Remshalden, Germany
info@LRP.cc - www.LRP.cc



!!! IMPORTANT !!!

Make sure that you do a factory reset (press SET button while turning speed on, with battery connected) after you have completed the firmware update to v3.0!

Otherwise malfunction or even damage may occur because of corrupted ROM in the microcontroller!!!

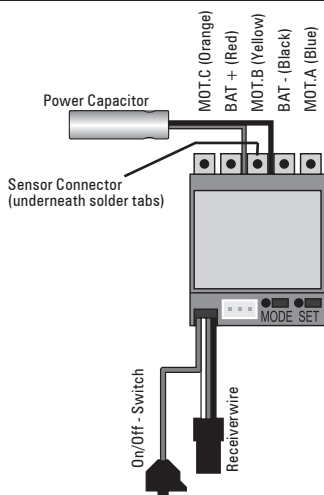
Specifications

	80905	80955		80905 & 80955
Pure Brushless Competition		yes	TwinBEC	6.0V/3.0A
Forward/Brake		yes	C ³ Technology	yes
Footprint		30.5 x 33mm	X-Brake	yes
Height	16mm	21mm	„Boost 0“ Mode	yes
Weight (excl. wires)	30g	36g	Multi-Protection-System 3	yes
Voltage Input		3.7 - 7.4V	Internal-Temp-Check System 3	yes
Typ. Voltage Drop* @20A		0.011V / phase	Blue LED	yes
Rated Current*		400A / phase	Power Wires	3.3mm ²
Compatible winding styles		Star	USB Software Updateability	yes
Rec. Motor Limit (@7.4V)		>4.5T	4 adjustable Modes (ACS2, Dual ADPC ^{MOD} 3, Autobrake)	yes
Plugged Fan	optional	yes		

* Transistors rating at 25°C junction temperature

Specifications subject to change without notice.

Connections & Explanations



Receiver Connecting Wire: The SXX-Series V2 is equipped with an LRP Multicon receiver wire. As supplied, it will easily fit in all ordinary receivers. Make sure you connect it to receiver with correct polarity and use channel 2.

Sensor Connector: The bi-directional multipole sensor wire connects the speed-control and the motor. Always use the sensor wire and do not alter or modify this cable! There are replaceable/optional hall sensor wires available. Through this connector this speed-control can be updated to the latest firmware using the optional „USB Bridge“ #81800.

Power Wires: For maximum performance, flexible silicone power wires without any connectors are used. The splitted solder-tabs allow easy and convenient replacement of the power wires. Nevertheless some soldering skills are required. Avoid soldering longer than 5sec per joint to avoid possible damage due to overheating of the components!

Heatsink: To achieve best performance even under extreme conditions, the heatsink has been directly mounted to the speed-control. This ensures the best possible heat transfer away from the speed-control.

Caution: Never attempt to remove the heatsink or your SXX-Series V2 may get damaged! The heatsink is an integral part, glued to the fet's and therefore cannot be removed.

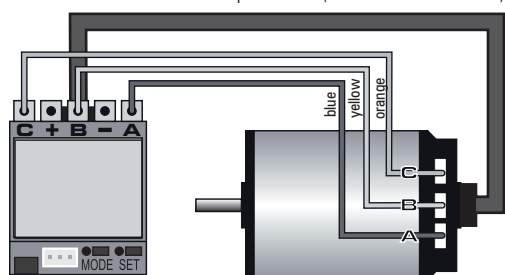
Plugged Fan (#80955 only!): your speed-control contains a high-performance low-profile (25x25x7mm) fan and blue anodised aluminium screws. The fan can be mounted on top of the heatsink and should be used for tough applications in hot conditions such as TC Modified or 4wd OffRoad. As a guideline we recommend using the fan when using 2S LiPo and motors with less than 5.0T. The fan get's plugged into the 3-pin connector on the front and there is a replacement fan set available, please refer to complete line-up under point „Spare- and Optional Parts“. On SXX Competition Version 2 (#80905) model you can also connect an optional fan to the same „port“ if needed.

Installation Guide

- Position the speed-control and capacitor where they are protected in the event of a crash and give you easy access to the connectors and buttons.
- Mount the speed-control and capacitor using the supplied thick/black doubled-sided tape
- 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.
- 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.

The SXX-Series V2 comes supplied with flexible 3.3mm² silicone power-wires without connectors. Be very careful with the correct wire sequence/colors since an incorrect connection may damage the speed-control! Avoid creating solder bridges on the solder-tabs and isolate all connections carefully.

- Connect the speed-control to the receiver (position: Channel 2)
- Blue power-wire → Speedo MOT.A to motor „A“
- Yellow power-wire → Speedo MOT.B to motor „B“
- Orange power-wire → Speedo MOT.C to motor „C“
- Connect the hall sensor cable to the speed-control (underneath the solder-tabs) and the 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 BAT+ to battery „Plus“
- Black power-wire → Speedo BAT- to battery „Minus“
- The speed-control is now ready to be set-up.

Thank you for your trust in LRP products. Your **LRP SXX Series Version 2** has been updated to the v3.0 firmware which affects the functions of your speed-control and makes your original manual obsolete!
Ryan Cavalieri, double IFMAR World Champion 2011 using SXX V2 speedos with v3.0 firmware!!!

This v3.0 firmware is perfectly tuned for 1:10th Modified OffRoad classes, please use other firmware files which will be better suited for those other classes.

Improvements over previous firmware versions:

- Dual ADPC^{MOD} 3 Feel & Boost profiles, perfectly tuned for 1/10th modified OffRoad racing.
- Active Torque Control for perfectly adjustable throttle control.
- Adaptive Brake Response for best control over entire speed-range and sharp brake response.
- Fading Compensation algorithm for linear feeling over entire run.

Please read the following instructions carefully before you start using your 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 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.

Calibrate Speed-Control to Radio

In setup mode the speed-control stores every step (e.g. learning your radios neutral and endpoints) by pressing the SET button. All the settings will be stored in the memory even if it will be disconnected from the battery.

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

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 and switch the unit on.
- Hold the SET button pressed for at least 3sec.
→ You entered setup mode and the SET LED flashes blue (it will flash until the setup is completed).

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

- This completes the setup procedure and your SXX-Series V2 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 start of each run switch on the transmitter first, then switch on the car.
- At the end of each run switch off the car, and then switch off the transmitter.
- For storage of the car, disconnect the drive battery at any time!

Check the LED's when moving the throttle on your radio to doublecheck everything is setup correctly.

Function	Status	Mode LED	Set LED
Neutral	---	off	blue
Neutral (when „Boost Zero“ enabled)	---	off	flashes blue
Forward	partial throttle full throttle	yellow	off blue
Brake	partial brake full throttle	red	off blue

Multi Protection System 3

New and improved protection system „MPS3“ which also informs you the cause of the shutdown with a special LED flashing sequence. You can indicate that a shutdown occurred when blue SET LED flashes very fast and the „error code“ (= cause for shutdown) is indicated by the MODE LED's as explained in table below.

Error Code LED flashing sequences:

Error Code	Mode LED's	Set LED	Reason	Possible Cause
#1	Yellow	Blue (fast flashing)	Speed-Control Thermal Shutdown	1. too high settings for ADPC Dual ^{MOD} power-profiles? 2. too high gear ratio? 3. too low motor wind for application? 4. too high mechanical motor timing?
#2	Red		Motor Thermal Shutdown	1. battery empty or wrong setting in ACS2? 2. battery damaged?
#3	Yellow/Red (alternate)		Battery Low Voltage Cut-Off	3. motor too strong for battery discharge capability? 4. poor connection (bad connector, bad soldering joint)?
#4	Yellow/Red (same time)		Motor Failure	1. sensor wire missing or defective? 2. drivetrain stuck? 3. motor defective (locked rotor, damaged sensor)?

Internal-Temp-Check System 3: allows you to read-out the maximum internal temperature that the speedo and motor have reached during the run. 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 feature allows you to accurately check if all is running well or if you're close to shutdown already.

How to read-out the temperature:

- switch at „OFF“ position.
- keep MODE button pressed while you turn switch to „ON“ (then release button).
- at first speed-control temperature will be indicated.
- SET LED will start to flash blue (MODE LED's are off) ...
- count the number of flashes. The higher the number, the hotter the speedo ran (shutdown occurs at 10 flashes).
- to change to motor temperature read-out, press MODE button one more time.
- SET LED will start to flash blue (MODE LED's are off) again, for motor the LED's on time will be shorter.
- count the number of flashes. The higher the number, the hotter the motor ran (shutdown occurs at 10 flashes).
- every flash below 10 equals to 5°C temperature decrease.

Temperature chart (speed-control and motor temperature):

#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
> -45°C	-40°C	-35°C	-30°C	-25°C	-20°C	-15°C	-10°C	-5°C	Shut-down
> -81°F	-72°F	-63°F	-54°F	-45°F	-36°F	-27°F	-18°F	-9°F	

Caution: motor temperature read-out only works if motor has a built-in NTC temperature sensor!

Active power reduction at critical temperatures: The cut-off function for both motor- and speed-control temperature is now an active type, in case you're getting near critical motor- or speed-control temperatures the speed-control will automatically switch to „Boost0“ mode during operation. This function allows you to finish your run or at least reach the pitlane during running, at reduced speed, as otherwise you would not finish your run!

Info: the critical temperature, at which this protection triggers, is considered as equal to 9 flashes!

The blue LED will flash, in case the 9 flashes were reached during the run (to indicate it has switched to „Boost0 mode“), but this mode will of course not be stored in the memory but your chosen profiles will be active for next run (after switching off/on) again.

You should not exceed 8 flashes during normal use for both motor- and speed-control temperature, please adjust your profiles, gearing and motor accordingly, so you stay within these safe limits.

At your own risk: if you wish to disable motor temperature cut-off completely you can do so by using value 0 in Mode.1. We call this function „Hardcore Racing Mode“. as it also disables the cell-voltage cut-off completely.

Important: The speed-controls thermal cut-off can not be disabled!

Mode Programming

The *SXX-Series V2* features 4 modes which enable you to adjust it 100% to YOUR special requirements. The factory settings are shown in grey colour.

- How to get into „programming the modes“ → Press MODE button for 3 or more seconds.
- How to check the stored values → Count the number of flashes of the blue SET-LED (* = value 1 | ** = value 2 | etc.).
- How to change the value → Press SET button to increase value by one step.
- How to get to the next Mode → Press MODE button once.
- How to leave the programming mode → If you are in MODE.4, press the MODE button one more time, which will also store the settings!

Important: do not turn the switch off before leaving Mode 4 (by one more press of MODE button) as otherwise your recent changes won't be stored in the memory of the *SXX-Series V2*!

Table of settings, values and modes: see below (grey-shaded values show „works default settings“)

Mode.1 (ACS2): v3.0 firmware only has cut-off function for 2S LiPo use, disable cut-off for all other batteries!

LED flashes	Remark	#0	#1
Yellow	Cut-Off Voltage use for	disabled	6.4V 2S LiPo

Important: Using value #0 in this mode will also disable the motor temperature cut-off function! Please refer to section „Multi Protection System 3“ for further details.

Mode.2 („Feel / Active Torque Control“):

LED flashes	Remark	#0	#1	#2	#3	#4	#5	#6
Red	Current Limiter	none	low	med	high	low	med	high
	Torque Timing %	0%		50%			0%	
	use for motors	ALL		X12 motors			all other motors	

Mode.3 („Boost / Timing“):

LED flashes	Remark	#0	#1	#2	#3	#4	#5	#6
Yellow/Red (alternate)	Boost Timing %	0%	10%	17%	22%	27%	32%	37%
	RPM Ramp	--			medium			

Mode.4 (Automatic Brake): allows you to set a slight braking action when your trigger is in neutral range.

LED flashes	#0	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Yellow/Red (same time)		dis-abled									

Special Features (further explanations)

Lower Motor Temperatures: LRP's engineers succeeded to further improve the commutation algorithm, which results in much lower motor operating temperatures then when other speed-controls are used. Our own extensive testing has shown up to 20°C lower motor temperatures, with same power then before!

Adaptive Brake Response: newly revised brake with sharper response and super-linear feeling!

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%!

Fading Compensation: a special algorithm compensates the feeling that the car may act slightly different with fully charged batteries vs. semi-full batteries. This algorithm takes that into account and compensates for that offset, so the feeling should remain about the same for the entire run.

Changing Mode Settings without the Transmitter: simply disconnect the receiver lead from the receiver and change the MODE settings on the speed-control as described under „Mode Programming“.

Works-Default-Settings: All LRP speed-controls come factory-adjusted (defaults are grey-shaded). If you loose track of the modes, you can restore the works default settings easily. With your radio switched on, hold the SET button pressed while you switch on the speed-control. This returns the unit to our works default settings.

Power Capacitor: Never run without a power-capacitor! It is needed for protection and increases punch, it must be connected to BAT+ and BAT- solderpads with shortest possible wires.

C³ Technology (Copper Core Cooling): lowest running temperatures, a special copper core bonds the bottom side fets to the heatsink for even cooling of all fet's which results in higher power towards the end of the run and a lower motorlimit.

Troubleshooting Guide

To eliminate all other possibilities or improper handling, first check all other components in your model and the trouble shooting guide 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.

Always check error by checking LED error code first, this gives you a good indication were to search!

SYMPTOM	CAUSE	REMEDY
Motor overheats	False settings on Mode's 2 and/or 3 Too high mechanical motor timing Too little motor cooling	Adjust settings of Mode's 2 + 3 Decrease mechanical motor timing Add cooling fan and/or heatsink
Insufficient performance. E.g. poor power, topspeed or brake	Wrong Gear ratio False settings on ADPC Dual ^{MAX2} Transmitter settings changed after set-up Power Capacitor damaged Motor or sensor-board in motor defective Speed-control defective	Adjust gear ratio Adjust settings under ADPC Dual ^{MAX2} Repeat set-up procedure Replace Power Capacitor Replace sensor-board or motor Send in product for repair
Servo is working, no motor function	Speedo plugged in incorrectly Multiprotection System activated Wiring problem Sensor wire missing/defective Motor defective Speedo defective	Plug speedo to receiver as Ch.2 Check settings for your application Check wires and connectors Install/replace sensor wire Replace motor Send in product for repair
No servo and no motor function	Speedo connected to receiver with wrong polarity Wiring problem Battery defective Crystal, receiver or transmitter defective Speedo defective	Connect speedo with correct polarity Check wires and connectors Replace with different battery pack Replace components one by one Send in product for repair
Motor stutters while accelerating	Sensor wire defective Motor or sensor board in motor defective Radio interference Power capacitor damaged Speedo defective	Replace sensor wire Replace sensor board or motor Change location of components Replace power capacitor Send in product for repair
Motor runs in reverse when accelerating forward on radio	Model with reversed gearbox!	Can not use a sensored brushless system!
Speed-control switches off frequently	Wrong setting in ACS2 (Mode.1)! Model used too often without cool-down periods Motor stronger than motorlimit or input voltage too high Stuck drivetrain or ball-bearing Motor defective	Change value of ACS2 (Mode.1) accordingly Let cool down after every run Use only motors and batteries which are within the specifications of the speed-control Maintain model Replace motor
Motor never stops, runs at constant slow speed	Transmitter settings changed after set-up Humidity/water in speedo Motor or sensor board in motor defective	Repeat set-up procedure Immediately unplug and dry speedo Replace sensor board or motor
Radio interference	Receiver or antenna too close to power wires, motor, battery or speedo. Receiver aerial too short or coiled up Receiver defective, too sensitive Transmitter defective, transmitter output power too low, servo problem Poor battery connection Transmitter batteries empty	See „Installation Tips“ and „Installation“ Replace components one by one Only use original manufacturers crystals Check plugs and connecting wires Replace / recharge transmitter batteries

AutoCell System 2 & TwinBEC (Mode.1)

AutoCell System 2: ensures that all batteries can be used safely for all applications, please select the correct value according to our table under „Mode Programming“. When the battery voltage reaches the selected cut-off voltage, the motor function will be disabled and the LED's will indicate that the shutdown has occurred due to undervoltage of your batteries (see right side „Multi Protection System 3“ for further details).

Caution: WorksDefault setting is 2S LiPo, so if you use other batteries you need to adjust Mode.1 before first use!

TwinBEC: a true BEC revolution! Constant 6V/3A output with input voltage from 3.0 to 7.4V, no need for a receiver battery or booster circuit even with 1S LiPo due to the integrated buck/boost technology!

There is no point in using a receiver pack in any class with *SXX-Series V2*. there is no benefit when using one!

If you still want to use a receiver pack, connect it to the receiver directly and leave the speed-controls switch in OFF position. Make sure the receiver packs voltage is within your receivers & servo's limitations (the speed-control itself can accept up to 7.4V from receiver pack),.

Dual ADPC^{mod.3} Profiles (Mode.2 & Mode.3)

Allows you to adjust the *SXX-Series V2*'s characteristics to different motor types, classes and personal likes! These two mode's combine LRP's completely revised active motor timing system, where the software calculates the best commutation & timing for „Torque/Feel“ and „Boost/RPM“.

Please take your time to understand the two modes and their functions, otherwise you will not fully benefit from the latest achievements built into this speed-control.

Be aware that Mode.2+3 are something entirely new and not the same as the settings we had on Version! speedo, so do not try to „transfer“ your knowledge from old speedo to new *SXX-Series V2*!

Mode.2 („Feel / Active Torque Control“): there are two separate groups, which you need to choose from, based on motor type: Within those two groups (1-3 and 4-6) the profiles only vary by different current limiter settings which are the perfect tuning option for the power-delivery with OffRoad vehicles!

- Group A (1 - 3) → for use with X12 & K4 motors, best efficiency with those motors.
 - higher value means faster power-delivery (e.g. 3 will have more torque then 1)

- Group B (4 - 6) → for use with all other motors (such as LRP X11, Novak, Tekin, SP, Orion, Epic, GM, Corally, etc)
 - higher value means faster power-delivery (e.g. 6 will have more torque then 4)

Team advise: when running on low traction surfaces with 2wd cars, the profiles 4-6 may also be an option with X12 based motors as this will give great control.

Mode.3 („Boost / Timing“): adjusts the boost timing %, which is applied to the motor based on it's RPM. There are 6 profiles (see chart on left side with details and numbers) and these are spread over useful timing range for 1/10th modified OffRoad racing where only little boost timing is required.

Higher settings will give you more overall power, especially midrange to topend.

Boost Zero Mode

If value #0 is choosen for Mode.2 **AND** Mode.3 (e.g. factory default!) the blue LED will flash in neutral trigger position to indicate that entire timing advancement is disabled for „true stock racing“ as required by certain federations!

USB Software Updateability

Through the sensor connector the *SXX-Series V2* can be updated to the latest firmware available for download at www.LRP.cc.

The optional „USB Bridge - Speedo Firmware Update + PC-Link“ (#81800) and a PC are required to do so, please refer to LRP website and the manual which comes with the interface for exact details how to do software updates to your speed-control.

The same USB-Bridge can be used to update all the latest LRP speed-controls (80905, 80955, 80880, etc). Please check guide at ww.LRP.cc for further details.

Spare- & Optional Parts

LRP offers a comprehensive line of accessories, as well as particular spare- and optional items. Here you find an overview, for a full picture please visit our website at www.lrp.cc:

#82512	Low Profile cooling fan (incl screws)
#82505	Power-Wire Set Brushless 2.6mm ² (red, black, blue, orange, yellow)
#82506	Power-Wire Set Brushless 3.3mm ² (red, black, blue, orange, yellow)
#81907	3.3mm ² Powerwire black (1.0m)
#81908	3.3mm ² Powerwire blue (1.0m)
#819307	Sensor-Wire „HighFlex“ 70mm
#819310	Sensor-Wire „HighFlex“ 100mm
#819315	Sensor-Wire „HighFlex“ 150mm
#819320	Sensor-Wire „HighFlex“ 200mm
#82530	SXX Version 2 Powercapacitor „WorksTeam“ 3.7-4.8V
#82531	SXX Version 2 Powercapacitor „WorksTeam“ 6.0-7.4V
#81800	USB Bridge - Speedo Firmware Update + PC-Link

Repair Procedures / Limited Warranty

All products from LRP electronic GmbH (hereinafter called „LRP“) are manufactured according to the highest quality standards. LRP 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
- Humidity/Water inside the speed control
- Mechanical damage of electronicl components/PCB
- Soldered on the PCB (except on solderpads)
- 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 LRP 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 LRP 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, LRP does not take any responsibility for the accuracy of these specs.

LRP-Distributor-Service:

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



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