

DIGITAL-ANALOG KONVERTER DAC RS 06



USER's MANUAL



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Cordial thanks for your decision in favour of a Lake People product!

Lake People electronic GmbH develops, manufactures and distributes products in the professional range, for broadcast, television, airports, exhibition halls, festival venues, theatres, large-scale installations, private studios and more. In the private sector as well, Lake People products become increasingly popular due to their outstanding quality.

Who develops Lake People equipment?

The devices are exclusively developed in Germany by the engineers of Lake People electronic GmbH. In doing so, the team of developers can draw on thirty years of experience and countless products for the proaudio domain.

Among others, the first German-made 20-bit A/D and D/A converters were developed by Lake People in the early nineties of the past century.

Who manufactures Lake People equipment?

The devices are exclusively manufactured in Germany by Lake People electronic GmbH or contractors in the company's vicinity.

Lake People puts high emphasis on domestic manufacturing. As well, all component suppliers are chosen in order achieve the main part of added value inland.

How do Lake People devices get to the customer?

Lake People devices can be obtained from respective specialist suppliers. If there is none such accessible regionally, the customer is supported by transregional distribution partners (google may help...) and, of course, by Lake People on-line shop.

A and if it doesn't work like it should?

Lake People devices are covered by a 24-month warranty. In case of any malfunction during this period, they can be shipped to the manufacturer directly. Of course, the client will benefit from Lake People's full technical support even when warranty has expired. Any technical questions or need for advice is welcome.



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General Safety Instructions

WARNING

For your protection, please read the following:

Water, Liquids, Moisture:

This appliance should not be used near water or other sources of liquids.

Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

Power Sources:

The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

Grounding:

Care should be taken that this appliance is operated with proper grounding only.

Power Cord:

Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

This unit is equipped with a 3-pole mains cable with German 3-pin mains plug. In some countries this unit must be operated with a mains adaptor, supplied by the owner.

Please refer to the table below to connect a mains plug:

OVERVIEW: POWER CORD FUNCTION AND COLORS				
	CONDUCTOR	COLOR	Alternativ	
L	LIVE	BROWN	BLACK	
N	NEUTRAL	BLUE	WHITE	
E ÷	PROTECTIVE EARTH	GREEN+YELLOW	GREEN	

U.K. Mains Plug Warning:

A moulded mains plug that has been cut off from the cord is unsafe. Discard the mains plug at a suitable disposal facility.

NEVER UNDER ANY CIRCUMSTANCES SHOULD YOU INSERT A DAMAGED OR CUT MAINS PLUG INTO A 13 AMP POWER SOCKET. Do not use the mains plug without the fuse cover in place. Replacement fuse covers can be obtained from your local retailer. Replacement fuses are 13 amps and MUST be ASTA approved to BS 1362.

Mains Fuse:

The mains fuse of this appliance is soldered in place and accessible from the inside only!!

A blown fuse may indicate an internal problem and should be replaced during qualified servicing or repair work!!

Switchable Power Supply:

Connect this unit to the power source indicated on the equipment rear panel only to ensure safe operation!!

This unit is provided with a switch-mode AC power supply and will work properly with all worldwide AC voltages from 90 . 260 V AC and 50 . 60 Hz.

Service / Repair:

To reduce the risk of fire or electric shock, the user should not attempt to service the appliance beyond the measures described in the operating manual. All other servicing or repair should be referred to qualified personnel!!

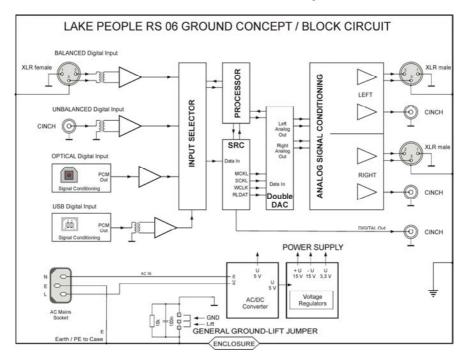


Electromagnetic Compatibility

This unit conforms to the Product Specifications noted as **Declaration of Conformity** at the end of this manual. Operation is subject to the following conditions:

- this device may not cause harmful interferences
- this device must accept any interference received,
 including interference that may cause undesired operation
- this device must not be operated within significant electromagnetic field

Das Erde / Masse Konzept



General GROUND-LIFT Jumper - accessible from the inside. Mind the SECURITY INSTRUCTIONS!!

Ex-works this jumper is set to the $\boldsymbol{\mathsf{LIFT}}$ position.

The internal ground potential is % ifted+by means of this jumper. As a result, the interconnection for DC voltages and lower frequencies (< 150 Hz) will be cut. Higher frequencies will be bled off to earth potential through the RC filter. The LIFT position is helpful in case of hum or jitter caused by different ground/earth potentials.

Of course full electrical protection is granted as the case is always connected to ground/earth potential!

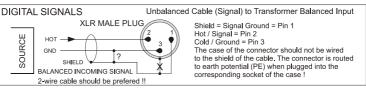
Unfortunately there is no general recommendation how to solve hum and jitter problems - or even minimize them. The best way to succeed is to check different options!! In case of balanced cables, it should always been verified if the shield of the cable is connected to the shell of the XLR connector. The shell is ALWAYS connected to earth potential when the connector is inserted!!

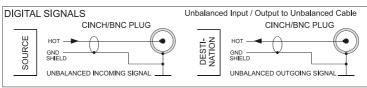
Concerning ANALOG inputs and outputs, the relationship between ground and earth may be modified. Electrical safety is always ensured, since the earth conductor is permanently connected to the enclosure!!

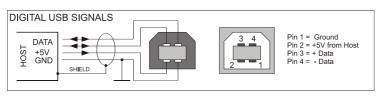
Please note that with jumpers in LIFT or GROUND position EMC emission might occur, for which the user is responsible only!

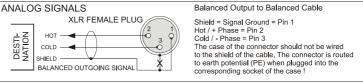
Connection / Connectors

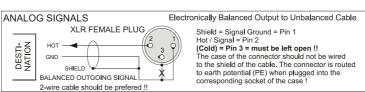
DIGITAL SIGNALS Balanced Cable (Signal) to Transformer Balanced Input Shield = Signal Ground = Pin 1 Hot / + Phase = Pin 2 Cold / - Phase = Pin 3 The case of the connector should not be wired to the shield of the cable. The connector is routed to earth potential (PE) when plugged into the corresponding socket of the case!

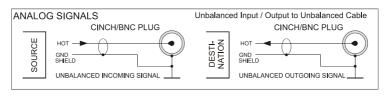












GENERAL INFORMATION

LAKE PEOPLE DAC RS 06 is a top-range D/A converter, distinguished by its resampling unit, its 32-bit double mono converters and very particular analog output stages. By means of their specially designed, variable low-noise and low-distortion circuitry, the DAC RS 06 fulfils even highest demands.

Features:

- four switchable digital inputs:
 - transformer balanced via XLR (AES 3), 24 bit / 192 kHz
 - coaxial via RCA (S/P-DIF, AES-3id), 24 bit / 192 kHz
 - optical via TOS-Link, 24 bit / 192 kHz
 - USB 24/96 input Style B, transformer-coupled,
 - USB 24/192 as an option
- coaxial digital output
- LED signaling for active input, lock, error/mute and resampling mode
- resampling / upsampling set to 96 kHz
- 32 bit double-mono converters (2 converters per channel)
- Delta-Sigma D/A converter with 120 dB dynamic range / -112 dB THD
- output level adjustable on the front panel
- sophisticated analog output stages, max. dyn. range / min. distortion
- 4 output levels adjustable via software
 - +3/+9/+15/+21 dBu for the balanced output respectively
 - -3/+3/+9/+15 dBu for the unbalanced output
- high-quality op-amps along the signal path
- high-quality MKP capacitors along the signal path
- 0,1 / 1 % metal film resistors throughout the unit
- balanced signals from the D/A converters to the outputs
- analog outputs electronically balanced via XLR, unbalanced via RCA
- elaborate supply voltage, low ERS caps for filtering and stabilization
- black aluminum case

THE CASE

The case as well as the front/rear panels are made of solid aluminum. This choice of material ensures high mechanical stability and resistance.

EARTH AND GROUND

The case of DAC RS 06 is grounded. Internal reference ground is bridged to protective earth by means of a jumper. The jumper is set to the 'LIFT' position (see also: page 7 "Earth/Ground concept", page 23 "Technical Appendix").

POWER SUPPLY

Mains power is provided via a three-pin IEC/CEE socket and mating "cold-appliance" mains cord with Schuko-type plug. Depending on the location of purchase other mains cords like GB-style, US-style or Chinastyle may be supplied.

This unit offers a switch-mode supply to enable trouble free worldwide operation with mains voltages ranging from 90 . 260 V and 50 . 60 Hz. The internal supply generates a stabilized and filtered voltage of 5 V DC which is used for many digital building blocks and from which other voltages are derived:

- -/- 15 Volt, stabilized and filtered for the analogue circuitry.
- +3,3 Volt, stabilized and filtered for other digital circuitry.

MAINS FUSE

The 1 A time-lag fuse is soldered in place on the circuit board. In case, it must be replaced with a fuse of the same type only.

CAUTION !! MIND THE SAFETY INSTRUCTIONS:

A blown fuse indicates an internal fault and should be replaced during qualified repair or servicing only !!

THE POWER SWITCH

The unit is activated by means of the power switch. Power-on status is indicated by the green LED below.



THE DIGITAL INPUTS

Four digital inputs are found on the unit's rear panel. They are denoted according to their electrical properties: balanced, coaxial (unbalanced), optical and USB.

You won't find terms like AES, S/P-DIF, professional or consumer here, since it doesn't matter at all which signal type is applied to a dedicated input.

The electrical inputs (Bal and Coax) accept PCM-encoded digital audio data with a word length of 16 ... 24 bit and 28 ... 210 kHz sample rate. So does the optical input.

- The balanced input is equipped with an XLR socket according to AES 3-1992, transformer-balanced, at 110 ohms input impedance and 200mV sensitivity at Tnom/2.
- The coaxial input is fitted with a RCA socket according to IEC 958 and AES-3-id resp., unbalanced at 75 ohms input impedance and 200 mV sensitivity at Tnom/2
- The optical input provides a TOS-Link connector according to EIAJ RC-5720.
- The USB terminal is specified as audio interface according to USB
 1.1 / 2.0 standard. The 24/96 or 24/192 USB circuitry uses the Tenor chip set. It accepts a choice of the usual sample rates which may be

dependend on your specific computer and/or software.

The 24/96 USB input is USB 1.1 based and normally runs without a specific software. For the 24/192 USB circuitry a special driver is needed which can be downloaded on our web site

www.violectric.com or www.violectric-usa.com

In order to avoid any interference caused from the host, the USB input is fully insulated, with the signal coupled via transformer.



THE DIGITAL OUTPUT

is located on the rear panel. It is fitted with a RCA socket according to IEC 958, unbalanced, at 75 ohms output impedance. The level at this output however complies with AES-3-id (1 Vss).

The data word on this output is the same as on the selected input with the identical sample rate when the resampling process is not activated. When the resampling process is activated, the sample rate on this output is 96 kHz.

THE ANALOG OUTPUTS

are situated on the rear panel, fitted with electronically balanced XLR terminals, as well as RCA sockets.

The unbalanced outputs are generated from the in-phase signals of the balanced outputs and so should not be used simultaneously when the following input stages have impedances lower than 5 kOhm.

Polarity of the XLR terminals complies with AES 14-1992:

1 = ground, 2 = (+) in phase, 3 = (-) out of phase.

Source impedance of all analog outputs is significantly lower than 1 (one) Ohm!

NOTE:

When connecting unbalanced lines to the balanced outputs, pin 3 must not be bridged but left unused (open). In this case the resulting output level will be 6 dB less.



INPUT SELECTION

By pressing the %NPUT SELECT%button, the inputs BALanced > COAXial > OPTO > USB can be selected.

If a valid signal is present at the corresponding input, the blue "lock" LED will come up. Unused inputs or such with an invalid digital signal present are indicated by the red %MUTE / ERROR%light.

THE RESAMPLING BUTTON

serves to switch on and off the resampling process.

The active resampling is shown by the yellow %N+LED.

Resampling means that all input jitter is removed and the input signals are converted into a 96 kHz sample rate. This is the frequency at which most contemporary converters perform best.

RESAMPLING

is a mighty feature for the transformation/restoration of jittered signals into high-quality signals. As well, the signal quality of 44.1 or 48 kHz sources can be improved by converting them to a higher rate. This also complies to the USB input which often suffers from jitter caused by improper treated computer outputs. With the aid of resampling process nearly all jitter (and not only specific ones) is removed from the USB data stream without using % synchronous USB mode+which is nonetheless also a feature of the USB input.

This isn't mystery at all, but a feature offered by so called sample-rate converters - available since the nineties of the past century.

While early sample rate converters could provide conversion ratios of 1:2 to 2:1 at 100dB dynamic range only, ratios of 1:16 to 16:1 at 140 dB dynamic range are feasible today.

In principle, the digital data stream is asynchronously disassembled by a DSP specially developed for this purpose and can be recombined at virtually any sample rate desired.

The quality of this recombination is directly dependent from the SRC's clock source. Therefore inside DAC RS 06 a special low jitter oscillator with typical < 1 pS (Picosecond!) phase jitter is used.

The oscillator is powered by a low noise source made of discrete components. By means of this process, all potential jitter vanishes almost completely and - due to the higher sampling rate - the analog filters after the converter stage can follow a much more straightforward and "musical" design. Furthermore, all digital input signals will be completed to 24 bit.

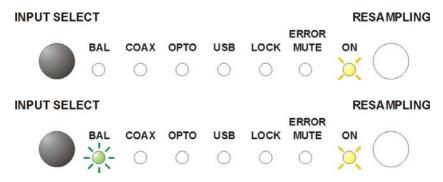


THE MENU consists of two points.

To enter the MENU push and hold the **right** %RESAMPLING+button for two seconds. The yellow %N%LED flashes constantly. The green LED under %BAL+flashes once to show that Menu 1 is entered. Afterwards it is either on or off.



1st Menu item: Sharp or soft digital filter in the D/A converter The status may be altered by pushing the **left** button.



LED off = the digital filter has sharp roll-off (ex works setting) LED on = the digital filter has soft roll-off.

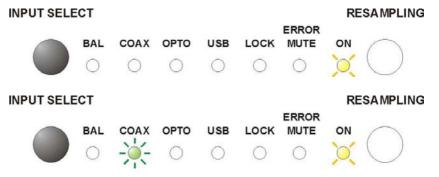
The digital filter has some influence on the conversion process. When generally digital audio data with more than 80 kHz sampling sate is input, the filter may be set to soft roll-off.

Depressing shortly the **right** button again calls the 2nd Menu item. The yellow **NLED** keeps flashing constantly.



The green LED under %GOAX+flashes once to show that Menu 2 is entered. Afterwards it is either on or off.

2nd Menu item: the phase correlation of the analog outputs The status may be altered by pushing the **left** button.



LED off = no phase shift on the analog outputs (ex works setting) LED on = 180° phase shift on the analog outputs.

Specially when more than one D/A converter is engaged a different phase on the outputs may be helpful.

Please note that the phase of all outputs is reversed: the left and right channel and the balanced and unbalanced output.

Exit the menu

To exit the menu push and hold the **right** %ESAMPLING+button for more than two seconds.

RESAMPLING

BAL COAX OPTO USB LOCK MUTE ON

O O O O O O O

ABOUT THE ANALOG OUTPUT LEVEL

Unlike in the analog world, digital technology uses a clearly defined maximum level, described as 0 dBFs, or "zero deciBels Full scale" in clear text. From this maximum downward, signal levels are expressed with a negative sign.

The %sanslation%of the digital level into analog is provided by the D/A converter and is extremely flexible, whereby several standards have established.

Professional broadcast facilities in Germany - i.e. radio and TV stations - understand 0 dBFs as equivalent to +15 dBu analog level.

In other countries this may be handled differently.

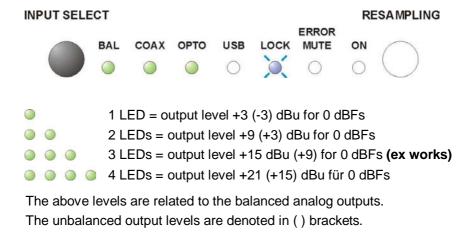
Notabene, +15 dBu represent a voltage of 4.5 Veff which may exceed the capabilities of many audio devices designed for a voltage swing of 1...2 volts. Therefore, the maximum output level of the DAC RS 06 can be adapted by means of software. While factory-preset to +15dBu, the maximum balanced output level can as well be set to +21 / +15 / +9 / +3 dBu. The unbalanced outputs have always 6 dB lower level: +15, +9, +3, -3 dBu (+9 dBu ex works).

While the level adjustments are made inside the D/A converter, these settings have no influence on the very low output impedance of all analog outputs.

Also there will be no signal degradation due to the truncation of the digital signal as the level setting is part of the 32 bit conversion process. Theoretically the signal can be attenuated by 8 bit or 48 dB without touching the original 24 bit resolution. When there are only 16 bit signals present on the digital input (CD quality), the same would be true for 16 bit or 96 dB attenuation.

THE SETTING OF THE ANALOG OUTPUT LEVEL

To enter the setting push and hold the **left** %NPUT SELECT+button for two seconds. The blue %LOCK+LED flashes constantly. One or more green LEDs will be lit constantly.



The output level may be altered by pushing the **left** or **right** button shortly. The blue %LOCK+LED remains flashing.



Exiting the level setting

To exit the level setting push the **left** %NPUT SELECT%button for more than 2 seconds. The blue %LOCK+LED stops flashing.

INPUT SELECT						RESAMPLING		
					1001	ERROR		
	BAL	COAX	ОРТО	USB	LOCK	2022	ON	
	\circ	\circ	\circ	\bigcirc	\circ	\circ	\bigcirc	

HOW IT ALL WORKS...

The DAC RS 06 offers high-class technology by means of well thoughtout handling, a variety of inputs, the resampling module, top-notch converters and, above all, its outstanding and flexible analog output circuitry.

Taken from one of four possible inputs, the digital signal is forwarded to the resampling module. If it is activated, its business is to prepare the incoming signals for processing in the subsequent circuitry. As well, the sampling rate is generally set to 96 kHz.

The resampling module recognizes the input data as PCM audio and evaluates the status bits found in the digital signal. Furthermore, the resampling module expands 16 or 20 bit incoming data to 24 bit data words and generates auxiliary clock signals needed for further processing of the digital signal within the unit.

The quality of the resampled signal is directly dependent from its clock source. Therefore a special low-jitter oscillator is installed which is fed from its own low noise power supply - build with discrete components. After the resampling stage, an AES/EBU encoded PCM signal is sent to the rear digital output, while the data contents and auxiliary clocks are fed to the digital-to-analog converters.

The D/A converters comprise a digital filter, the output level control, the stereophonic converters as such, as well as the analog output filters. Each converter is based on a delta-sigma architecture and provides a dynamic range of 124 dB. According to the double-mono architecture two 32 bit D/A converters per channel are used inside DAC RS 06 to achieve higher linearity and lower noise. An incoming 16, 20 or 24 bit signal is expanded in a 32 bit signal inside the converters.

The output level setting is part of the 32 bit processing. By this measure all those should be satisfied who felt uncomfortable concerning bit truncating whilst attenuating former 16 or 24 bit signals.

The internal frequency of the digital signal (and potential interference therein) is very high in comparison with the useful analog frequencies. Therefore, the subsequent analog low-pass filters have to meet less

severe requirements in terms of high-frequency roll-off and can therefore be realized as "musical", discrete two-pole filters.

Without careful consideration of the analog output stages it wouldn't have been possible to make the outstanding performance of the topnotch converter available at the analog outputs.

In case of DAC RS 06, the converter is followed by an amplifier specially designed for this purpose, with a topology similar to an instrumentation amplifier.

It distinguishes itself by a wide dynamic range, minimum distortion and high flexibility with regard to the achievable output level.

Within this amplifier, the output currents of the D/A converters are transformed into voltages, while any interferences and processing frequencies are completely removed.

An error amplifier caters for minimum DC offset.

From the D/A converters to the rear outputs the signal remains completely balanced.

Only now follows the output driver stages, feeding the output signal to the corresponding terminals at extremely low impedance.

The unbalanced outputs are generated from the in-phase signals of the balanced outputs and so should not be used simultaneously when the following input stages have impedances lower than 5 kOhm.

DISMANTLING / JUMPER SETTINGs

Hint:

Here we are talking about internal adjustments inside your DAC RS 06. You are in need of a screw drivers TORX style size T10 or a 3mm hex allen key.

You should by all means

PULL THE MAINS PLUG!!!

Only thereafter the settings can be altered without any hazard.

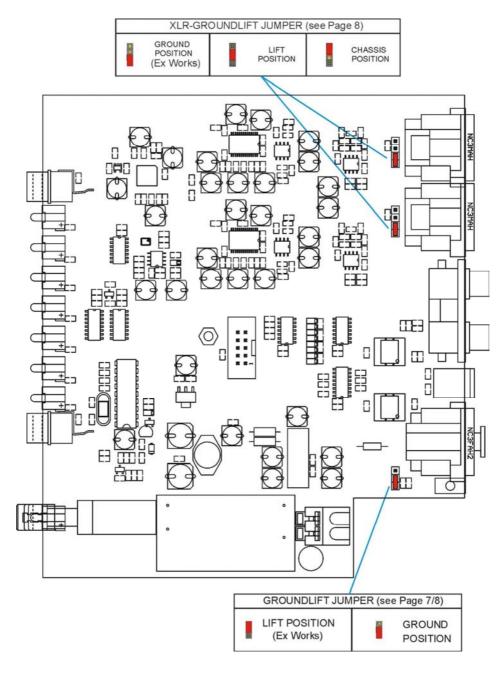
DISMANTLING

To avoid damages please follow the instruction below:

- 1. screw off both upper screws on the front panel
- 2. screw off both upper screws on the back panel
- 3. now lift the upper lid
- 4. make your personal jumper settings

Assemble the unit in reverse order

JUMPER SETTING DAC RS 06



TECHNICAL DATA DAC RS 06

All Measurement RMS unwtd., 20 Hz - 20 kHz, Sample-rate 48 kHz, digital level = 0 dBFs, analog output level = +15 dBu, Resampling engaged, as not otherwise noted

Digital Inputs: - 1 x XLR female, transformer balanced,

impedance 110 ohms according to

AES3-1992, Sensitivity 200mV @ Tnom/2 - 1 x Cinch, unbalanced, impedance 75 ohms

according to IEC 958 resp. AES-3-id Sensitivity 200mV @ Tnom/2

- 1 x optical, TOS-Link, acc. to EIAJ RC-5720

- 1 x USB, Style B, according to USB 1.1 / 2.0

transformer decoupled

Digital Input Formats: AES/EBU, S/P-DIF up to 24 Bit

Input Sample Rates: 28 - 210 kHz

Analog Frequency Range: 4 Hz ... 53 kHz (-0,5 dB)

Bal. Analog Outputs: 2 x XLR male

Bal. Analog Output Level: +21 / +15 / +9 / +3 dBu (selectable)

ex works set to +15 dBu,

Output CMRR(@ 15 kHz): > 60 dB
Output Impedance: < 1 ohms
Unbal. Analog Outputs: 2 x Cinch

Unbal. Analog Output Level: +15 / +9 / +6 / +3 / -3 dBu (selectable)

ex works set to +9 dBu,

Output Impedance: < 1 ohms

Supply Voltage: 90 . 260 V AC, 10 VA
Case, Front and Back: Black anodized Aluminum
Dimensions: 168 x 49 x 145 mm (W x H x D)

EC CONFORMITY STATEMENT:

We herewith declare that the following unit

Name: VIOLECTRIC DAC RS 06

Serial No.: -all -

is in conformity with the following EC directives:

2006/95/EG Low voltage directive

20014/30/EC EMC directive

EN 60065:2002+A12:2011 Security directives for audio-,

JIS C6065:2013 video- und similar electronic devices
2001/95/EC General Product Safety Directive

For verification of conformity with regard to electromagnetic compatibility the following harmonized standards are applied:

EN 50081-1:1992 Generic emission standard Generic immunity standard

Product family standard for audio, video, audio-visual entertainment apparatus:

EN 55013:2001 EN 61000-3-2:2000 EN 55020:2002 EN 61000-3-3:1995

2011/65/EU, RoHS directive

2012/19/EU, WEEE directive / Member No.: DE 26076388

This declaration is given under responsibility of:

LAKE PEOPLE

EOPLE

LAKE PEOPLE electronic GmbH Turmstrasse 7a D-78467 Konstanz Fon +49 (0) 7531 73678

Fax +49 (0) 7531 74998

Tried Rein

Konstanz 22.03.2016

Fried Reim

CEC

WARRANTY

Since 1986 we are constructing and manufacturing sophisticated electronics for ambitious customers.

Since the early beginnings we are trying hard by accompanying measures, the use of 1st choice components and multiple quality checks during production to avoid faults at large.

We are quite effective in that and this is . amongst others - why we enjoy such a good reputation.

Despite all accurateness faults may show up which may derogate the proper operation of your product.

In this case your unit is protected by a 2-year Warranty!

Needless to say that we will care for your product even after the expiration of the warranty. If it is necessary please dispatch your item to:

Lake People electronic GmbH Fon +49 (0) 7531 73678

Turmstrasse 7a Fax +49 (0) 7531 74998

D-78467 Konstanz E-Mail info@lake-people.de

Your warranty claim begins with the date of purchase, which should be denoted on your proof of purchase.

In case of return do not forget to include the receipt of sales or a copy of the receipt.

Please also include a short description of the fault(s).

For the reshipment we need you correct address !!

Care for a safe packaging. Best is to use the original packaging.

Please keep in mind that we cannot accept collect freight.

We will grant a guick repair and guick return of the unit.

to a second a second consistency of the seco			
In case of a warranty repair we will reship free of charge.			
Please denote here the serial number and	the date of purchase:		
'			
Serial Number	Date of Purchase		