

OPERATING MANUAL

LED DIMMER SPY 2440

FIRMWARE 2.08



For LED music stand lights of the N control concept (24 V DC)



Model 1624 N with pipe profile



Model 1602 N with 2 light heads

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1. General

The LED technique offers fascinating possibilities in the field of stage and architecture. Technical solutions to control or dim the LEDs are also accordingly diverse. The PSU SPY 2440 offered by ARNOLD Lichttechnik is specially designed for the electric supply and dimming of LED music-desk lights of the N control concept with 24V DC constant voltage. With a PSU SPY 2440 you can control, depending on the system design and lamp models, up to **32 2-channel LED music-desk lights** in the 2-channel operating mode or up to **64 1-channel LED music-desk lights** in the 1-channel operating mode.

2. Device description / Connection possibilities

2.1 The 2-channel operating mode:

The PSU has a 4-pin speakON socket (**TWO CHANNEL MODE**) by means of which the two controllable channels are outputted. At this output, up to a total of 32 LED music-desk lights (2 channel resp. 600 W maximum connected load) may be connected. For an operating voltage of 100-120 V AC, the number decreases to 26 LED music-desk lights (2 channel).

2.2 The 1-channel operating mode:

The PSU has **two** 4-pin speakON sockets (**ONE CHANNEL MODE**) When using LED music stand lights with only one control channel or with manual color change, up to **respectively** 32 LED music stand lights (a total of 64 units) can be connected to **each of** these speakON outputs. For an operating voltage of 100-120 V AC, the number decreases to respectively 26 LED music stand lights (a total of 52 units) resp. maximal 500 W connected load.



2.3 Dimmer technology:

The principle of the PSU is based on a 24 V DC output voltage, which is analog controlled in the range between 13.8 – 24 V DC. In order to ensure a fault-free and flicker-free dimming, the device operates **without PWM** with an analog voltage regulator and an internal 18-bit D/A converter. Moreover, the PSU is provided with a software interpolation which already for 8-bit DMX signals ensures an absolutely continuous dimming process.

The PSU SPY 2440 has 2 high-quality, short-circuit proof switching power supplies with active power factor correction filter (PFC). Both output channels are protected by an external electronic protection against overload and short circuit. In the mains supply socket a highly effective EMC filter is also located.

2.4 Plug-in distributors, connection and installation cables

For the proper operation of the system, a voltage drop of maximum 8% respectively 2 V must be kept in the wiring (at the farthest consumer). In order to keep the voltage drops of the system wiring as low as possible, a sufficient cable cross-section must be chosen according to the respective national standards.

A local or permanent installation of the cabling system must be realized in accordance with the country-specific standards (in Germany DIN VDE 0100) and the applicable regulations regarding the cable sizing, overcurrent protection devices, max. allowable voltage drops as well as with the safety regulations

The speakON cables (4x2.5 mm²) provided for mobile systems require no special protective device and are designed for the maximum current of the PSU. The XLR outputs on all plug-in distribution boxes (VPY4 / VPY8) are equipped with internal fine-wire fuses (interchangeable). A modification of this plug-in distributors and the connecting cable can result in a loss of the intrinsic safety and therefore is not permitted.

2.5 Safety instructions

The PSU has the protection class IP20 and is only approved for operating in dry rooms. It is used exclusively for dimming of LED luminaires with an operating voltage of 24 V DC constant voltage.

2.6 Scope of supply

The PSU is delivered in a 19" housing (2HE) as a built-in device for a 19" rack or cabinet. The PSU can optionally be supplied in a 19" case 2HE.



SPY 2440 MK2 in case 2HE

3. The configuration / operating of the SPY 2440 (PSU)

3.1 Operating elements/ Display / Operating philosophy

For the operation and parameterization of the PSU, the unit is equipped on the front with a 4-line OLED display, a jog dial and two pushbuttons. The display shows the current system status, adjustable parameters and service functions.



The status LEDs arranged on the left side of the display indicate the following states:

- | | | |
|-----------|----------|------------------------------------------------------------------------------------------------------------------------------------|
| 1. POWER | [green] | - Mains voltage is applied |
| 2. DMX OK | [green] | - DMX signal is present |
| 3. MANUAL | [yellow] | - Manual mode activated |
| 4. ERROR | [red] | - static → defective case fan
blinking → Thermal overload of the power supply units
(automatic power reduction is activated) |

Six main menu pages are available for status and parameters:

- | | | |
|-------------------|---|-----------------------------------------------|
| 1.MAIN STATUS | < | - Status operating mode, DMX and output level |
| 2.THERMAL STATUS | < | - Status temperature, fan status |
| 3.DMX SETUP | < | - Parameters for DMX |
| 4.OPERATING SETUP | < | - Parameters for operating mode |
| 5.DISPLAY SETUP | < | - Parameters for the display |
| 6.MANUAL MODE | < | - Status & parameters for manual mode |

The first line of the display always shows the currently selected main menu page.

In the first line on the right side, the character '<' appears, which indicates the focus on the respective active line for operation with the jog dial.

If '<' is in the first line, another main menu page can be selected by turning the jog dial. By pressing the arrow keys up / down you can turn to the lower display line if adjustable parameters are present.

If '<' is now in the desired lower line respectively the desired parameters, then changes can now be made only by turning the jog dial.

Attention! Each parameter change is immediately taken over, stored and activated without other actuation of operating elements

3.2 MAIN STATUS

The first main menu item **1.MAIN STATUS** is a status display of the PSU. Information about the current operating mode, the DMX start address, the system status, and also the level of the two output channels are displayed. Regardless which menu item or parameters was accessed by the user, the PSU turns automatically after 10 minutes to this main menu item. There are no adjustable parameters in this menu.

In manual mode, this status display is replaced by the main menu item **6. MANUAL MODE**.

1.MAIN STATUS

MODE= 1 | CH1:000% - MODE indicates the currently selected operating mode
DMX: 001 | CH2:000% - DMX Display of the set DMX start adresse
SYSTEM STATUS OK - CH1 / CH2 Overview of the controlled outputs

The last line gives information about the current status of the device.

SYSTEM STATUS OK - fault-free operating state
POWER REDUCE: 000% - Thermal overload of the power supply units (Automatic power reduction is activated)
FAN FAILURE - faulty case fans (blocked or worn-out)

3.3 THERMAL STATUS

The main menu **2.THERMAL STATUS** also serves purely as a status display for temperature of the two internal power supplies and the speed of the case fan. There are no adjustable parameters in this menu.

2.THERMAL STATUS

T1: 00°C | RPS1: 00 - T1 / T2 Temperature of the respective power supply unit channels
T2: 00°C - RPS1 Speed of the case fan rot./second (29 nominal)
POWER REDUCE: 000% - Thermal overload of the power supply units (Automatic power reduction is activated)
Level of the present power reduction (0-20%)

Notes about Status POWER REDUCE

In the event of a thermal overheating of the PSU respectively of the two internal power supplies, the output power is automatically reduced by the respective displayed % value (max. 20%). If this power reduction is active, additionally the red status LED on the left side of the display flashes. After cooling of the power supply units, the output power is automatically turned back to the rated power. Due to a very slowly reducing or increasing of the output power, possible optical brightness changes of the connected LED music-desk lights are minimized.

3.4 DMX SETUP

The main menu item **3.DMX SETUP** is used for setting DMX parameters.

3.DMX SETUP

- 1.ADDRESS:** - Selection of the DMX start address from 1 to 512
- 2.MODE:** - DMX mode 8-bit / 16-bit
- 3.DMX HOLD:** - DMX Hold function Yes, No or default
- 4.DEFAULT LEV.:** - Default level in 0-100% (if 3.DMX HOLD=default)

Notes about Parameter DMX HOLD / DEFAULT LEV.

For **DMX HOLD [Yes]**, in the case of interruption of the DMX signal the last received DMX value is stored and remains active.

If **DMX HOLD [NO]** is selected, then in the case of interruption of the DMX signal both channels are set automatically to 000%.

If **DMX HOLD [DEFAULT]** is selected, then in the case of interruption of the DMX signal both channels are set to the predefined percentage value **DEFAULT LEV.**

3.5 OPERATING SETUP

The main menu item **4.OPERATING SETUP** is used to set the operating mode parameters.

4.OPERATING SETUP

- 1.MODE:** - Selection of the operating mode
- 2.CURVE:** - Selection of the dimming curve
- 3.DIMMING:** - Application method of the DMX input signals

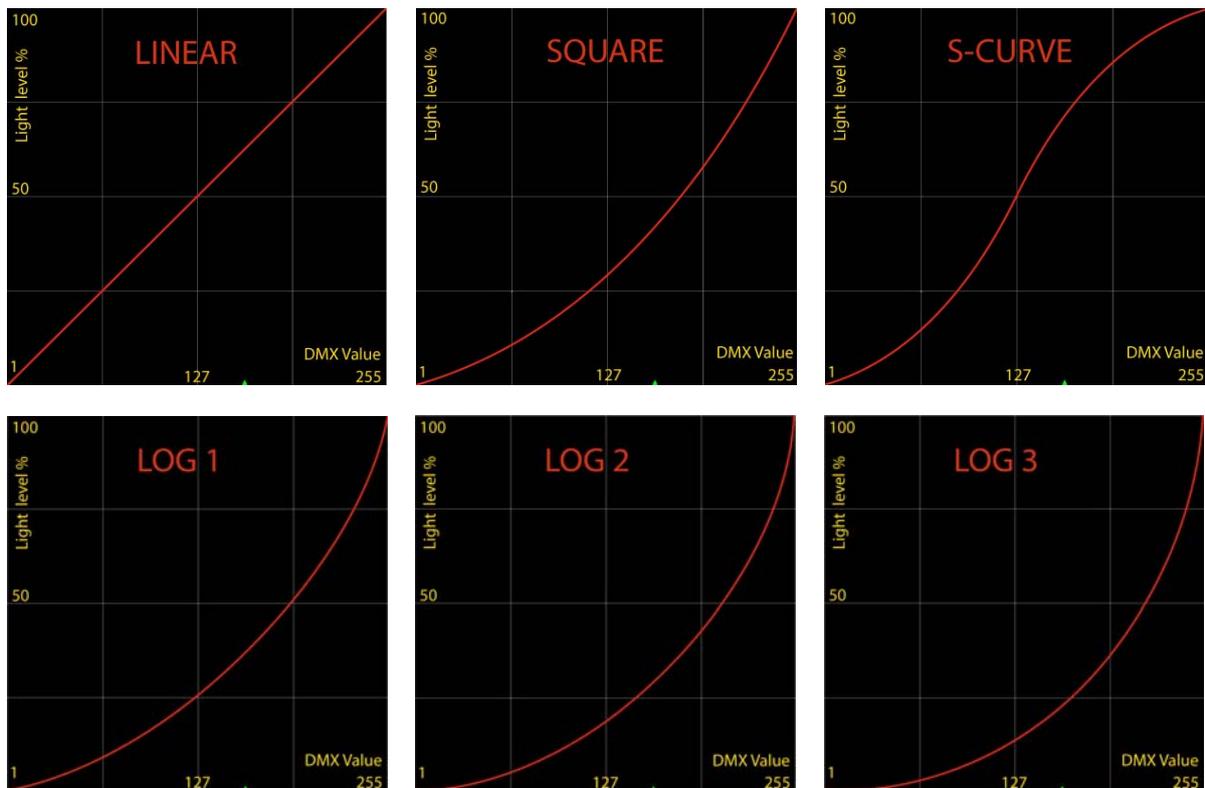
Selection possibilities for 1. MODE (operating mode)

- 1.MODE:** **1 - <1CH>** - 1 channel, DMX Start address controls both output channels
- 2 - <2CH>** - 2 channel, DMX Start address controls channel 1 and the following address controls channel 2
- 3 - <2+MAS>** - 2 channel, additionally the 3rd following DMX address acts as master channel
- 4 - <BR+CO>** - 2 channel, DMX Start address controls the brightness and the following address controls the light color (balance channel 1 & 2)
- 5 - <MANUAL>** - Manual mode, when this mode is selected, both channels can be controlled manually (without DMX- signal) in Main menu item **6. MANUAL MODE**. (See page 9)

Selection possibilities for 2. CURVE (dimming curve)

- | | | |
|------------------|-------------|-------------------------------------------------|
| 2. CURVE: | 1 - LINEAR | - linear characteristic curve |
| | 2 - SQUARE | - square characteristic curve |
| | 3 - S-CURVE | - characteristic curve with S form |
| | 3 - LOG 1 | - user characteristic curve 1 (firmware update) |
| | 4 - LOG 2 | - user characteristic curve 2 (firmware update) |
| | 5 - LOG 3 | - user characteristic curve 3 (firmware update) |

Representation of the dimming curve



Selection possibilities for 3. DIMMING (Software interpolation)

- | | | |
|--------------------|------------|-----------------------------------------------|
| 3. DIMMING: | 1 - DIRECT | - direct application of the DMX input signals |
| | 2 - SMOOTH | - 16-bit software interpolation |

Notes about parameter 3.DIMMING

If you use the parameter **DIMMING [SMOOTH]**, the 16-bit software interpolation is activated. With this feature, an optically continuous control of the output channels is possible especially when using 8-bit DMX input signals. The software interpolation can also be used with 16-bit DMX input signals for an additional smoothing the output signal.

3.6 DISPLAY SETUP

The main menu item **5.DISPLAY SETUP** is used to set the parameters of the displays.

5.DISPLAY SETUP

- 1.DISPLAY OFF:** - Automatic display turning off (OLED), YES / NO
- 2.TIMEOUT: 005 MIN** - Time for display shutdown in minutes

Notes about parameter 1.DISPLAY OFF and 2.TIMEOUT

If the parameter **DISPLAY OFF [YES]** is selected, then the OLED display is turned off automatically after a defined time **TIMEOUT [005 MIN]**. With this function, the display and possibly disturbing status LEDs will be disabled during the operation. By pressing any key or by turning the jog dial, the display and the status LEDs is automatically switched on again.

In the case of a system failure or when the red status LED "ERROR" is active, the display is immediately activated and remains active until the failure is corrected. Therefore, all display parameters in the "ERROR" status have no function.

3.7 MANUAL MODE

The main menu item **6.MANUAL MODE** is used to set the parameters in manual mode.

- 6.MANUAL MODE (OFF)** - shows the status for manual mode, OFF / ON (see page 7.)
- 1.CHANNEL 1: 000%** - Level for the output channel 1 in %
- 2.CHANNEL 2: 000%** - Level for the output channel 2 in %

Notes about parameter 1.CHANNEL [1] and 2.CHANNEL [2]

When the manual mode is activated (see page 7), both channels can be separately adjusted by setting these parameters. No DMX signal is required in this case.

A consideration of dimming curves is not provided in this mode. Therefore, the linear dimming curve is always used. **In manual mode, the main menu item 6.MANUAL MODE replaces the status display 1.MAIN STATUS.**

4. Technical data



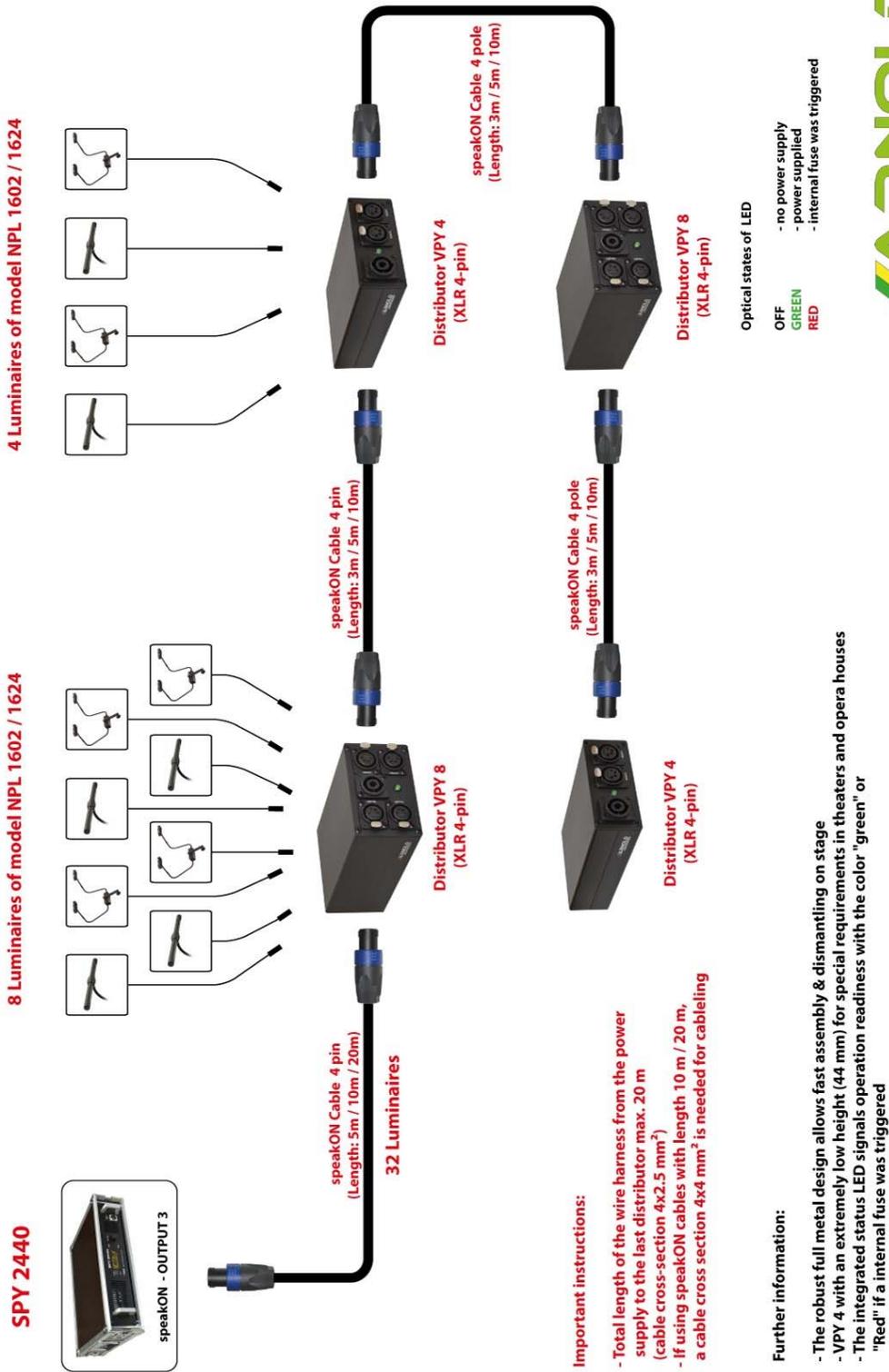
Article number:	604-050
Housing	19" 2HE aluminium, black/ silver anodized
Output voltage:	13 - 24V DC
Output power:	2x 300W / 2x 12.5A (2 x 250W at 100-120V AC)
Dimming:	analog voltage control (no PWM)
Power consumption:	max. 800W
Current consumption:	3.3A / 240V ~ (8 A / 100-120V ~)
Operating voltage:	100 - 240V ~ (50/60 Hz)
Pin assignment speakON:	<p>OUTPUT 1: 1+ = 24 V DC channel 1 1- = GND channel 1</p> <p>OUTPUT 2: 1+ = 24 V DC channel 2 1- = GND channel 2</p> <p>OUTPUT 3: 1+ = 24 V DC channel 1 1- = GND channel 1 2+ = 24 V DC channel 2 2- = GND channel 2</p>
Pin assignment DMX (5-pole):	1 =Shield, 2 =Data -, 3 =Data +, 4 =NC, 5 =NC
Control signals:	DMX 512 (USITT assignment) 8/16-bit
Dimensions:	482 x 88 x 367 (BxHxT) Depth: + 40 mm grip
Weight (without case):	6.5 kg

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5.2 Mobile wiring for 2-channel operation

2-Channel wiring diagram for LED Music Stand Lights System N



6. Firmware update

The PSU SPY2440 can be updated via the front-side USB interface (Type B) with a new firmware . The steps for this purpose are hereafter explained.

1. Components needed / Preparing for the update

1. For the transfer of the update, you need a USB cable from of type A/B (USB printer cable)



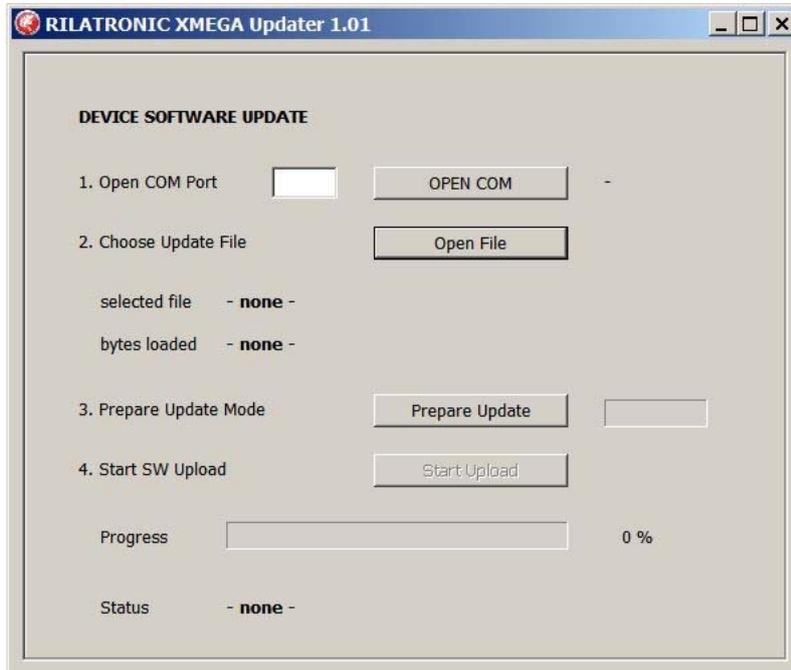
2. A PC/notebook for the update tool „xmega_update.exe“.
This tool does not need to be installed separately and is executable directly under Windows XP / 7/8/10 .
3. The current „Virtual COM Port Driver“ (manufacturer site www.ftdichip.com)
We recommend the following version 2.12.18 (CDM21218_Setup.exe)
You will always receive the best driver along with the firmware update published by us.

2. Connection of the PSU with PC/notebook

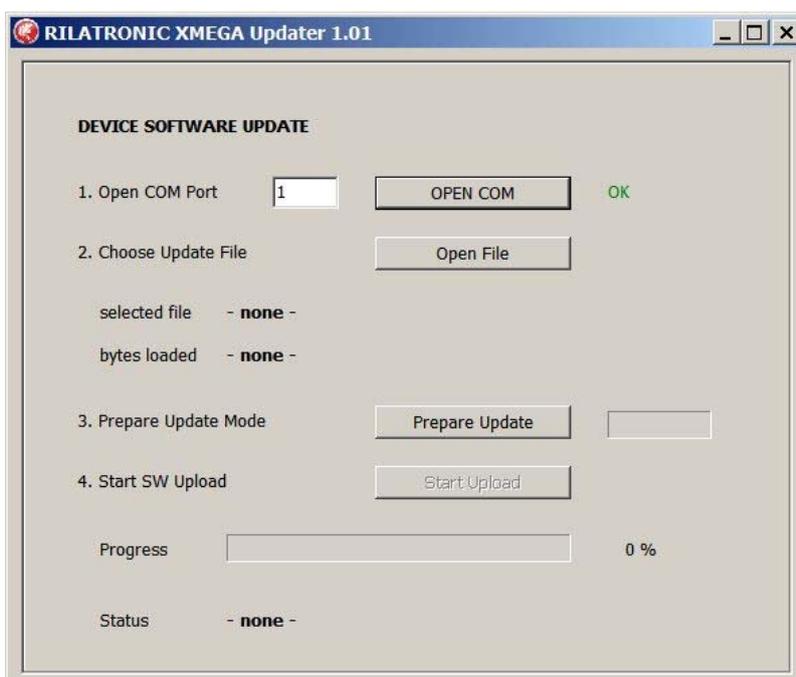
1. Please install the USB driver (CDM21218_Setup.exe) on your PC/notebook.
(observe the instructions for application)
2. Connect the PSU SPY2440 via the USB cable with your PC/notebook.
ATTENTION The PSU must not be be connected with the power supply system when you connect it to the PC!
3. Start now the update tool „xmega_update.exe“ and follow the next steps
Under point 3 Transfer of the firmware update

3. Transfer of the firmware update

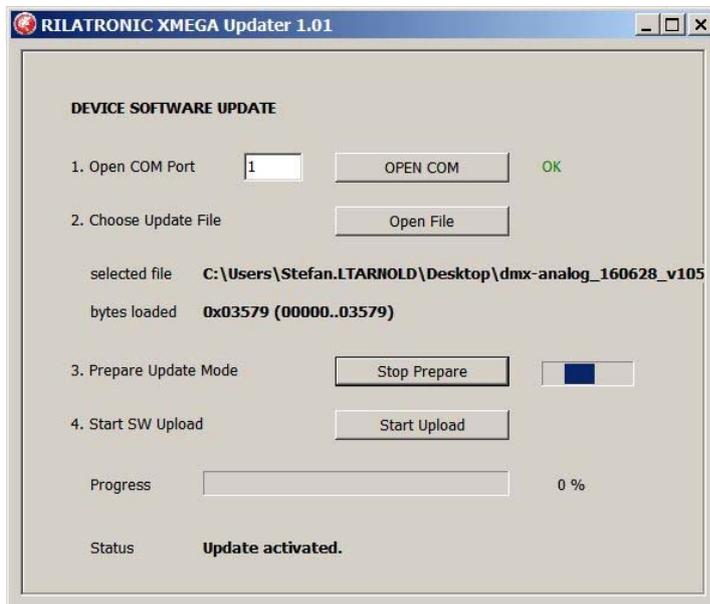
1. After starting the XMEGA updater 1:01, the following window appears:



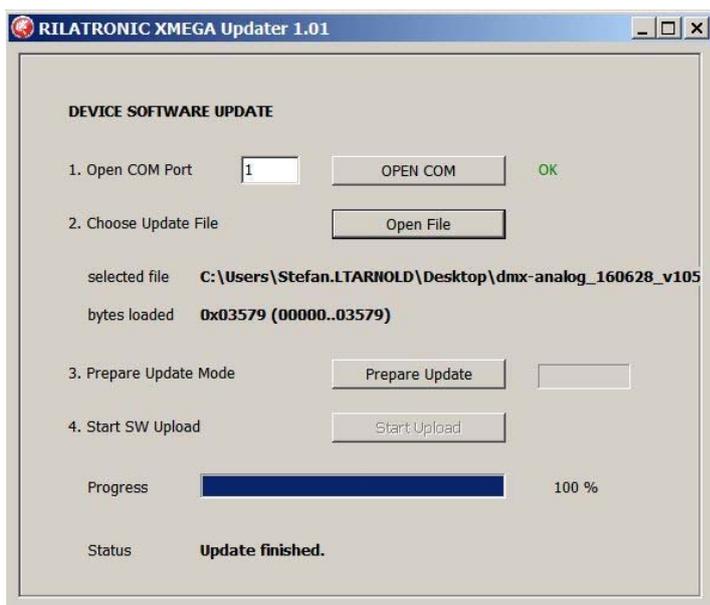
2. Enter at „Open COM Port“ the address of your USB „Virtual COM Port Driver“.
If this is not known, you will find this information in Windows 7 under
Control Panel / System and Security / System / Device Manager /
Ports (COM & LPT). After clicking on the button "OPEN COM", the successful
port opening is confirmed with a green "OK". If a red message „Com Port Open failed“
appears please check your COM port settings.



- As a next step you click on the button „Open File“ and select the die firmware file (.hex) in the File manager.
- Then click on the button "Prepare Update". Now a running blue progress bar indicates that the update mode is enabled (update activated).



- In this state, connect now the PSU SPY2440 with the power supply. If the connection is successful, you can see on the OLED display of the PSU a running point on the top line and also the constantly lit status LED "ERROR".
- Then click on the button "Start Upload" to activate the transmission. The status indicator "Progress" shows the progress of the transfer. After completion of transmission (100%) the PSU starts again automatically.



- Finally, remove the USB cable from the PSU. The update is completed.

IMPORTANT! During the transfer of the firmware, the PSU may not be disconnected from the mains respectively the data connection between the PC and PSU may not be interrupted.