OPERATING MANUAL

DMX DC Motor Driver 3901A-H Mk1

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Thank you for choosing a SOUNDLIGHT device.

The SOUNDLIGHT DMX Motor Driver 3901A-H is an intelligent DMX decoder decoding digital data complying with standards USITT DMX512/1990, DMX512-A, DIN 56930-2 and ANSI E1-20 DMX RDM. The interface can drive a DC motor, max. 24VDC 2.5A . The interface can be used with all standard light control systems. Its special advantages include:

- **universal protocol decoding**
  Recognizes all variants of the protocol as defined by USITT / ESTA / DIN

- **future-proof**
  The unit is software controlled an can easily be adapted to any change in protocol definition.

- **integrated hysteresis**
  Adjustable hysteresis ensures flicker free switching

- **simple supply**
  The power supply is from standard regulated DC voltage, 24V DC

- **signal loss**
  In the case of a loss of the drive signal a pre-definable action will be taken.

- **cost-effective**
  The SOUNDLIGHT 3901A-H is a cost-effective solution for many purposes.

FEATURES

The DMX Motor Driver 3901A-H has been designed to drive a DC motor with varaible speed, either in continuous mode or in positioning mode using an external position potentiometer.All parameters can be set or controlled via DMX RDM. The decoder comes in DIN rail format and can be mounted on standard 35mm rails. DIN rail units do not come with a separate start address board. If a spearate start address board is needed, it must be orderted separately.

NOMENCLATURE

These symbols are used within this manual:

DANGER ! May cause harm to user and/or equipment

INFO: How to setup your device

INFO: Status information

Please unpack carefully and check that all items are intact. When leaving our factory, the interface has been in good condition. In case of damage during transport please notify the carrier immediately and obtain a written report.

When unpacking, you should identify these items:

*   the interface 3901A-H
*   this manual

SAFETY WARNING

This interface must be installed, wired and set up by a skilled technician. Read this manual carefully before applying power. Test safety measures manually *before* reverting to automatic or DMX operation (e.g.: wrong assignment of end switches may prevent the switches from working and thus cause the motor to *not* stop!) Failure to comply with all safety requirements may generate damage to both, personnel and equipment.

CONNECTORS
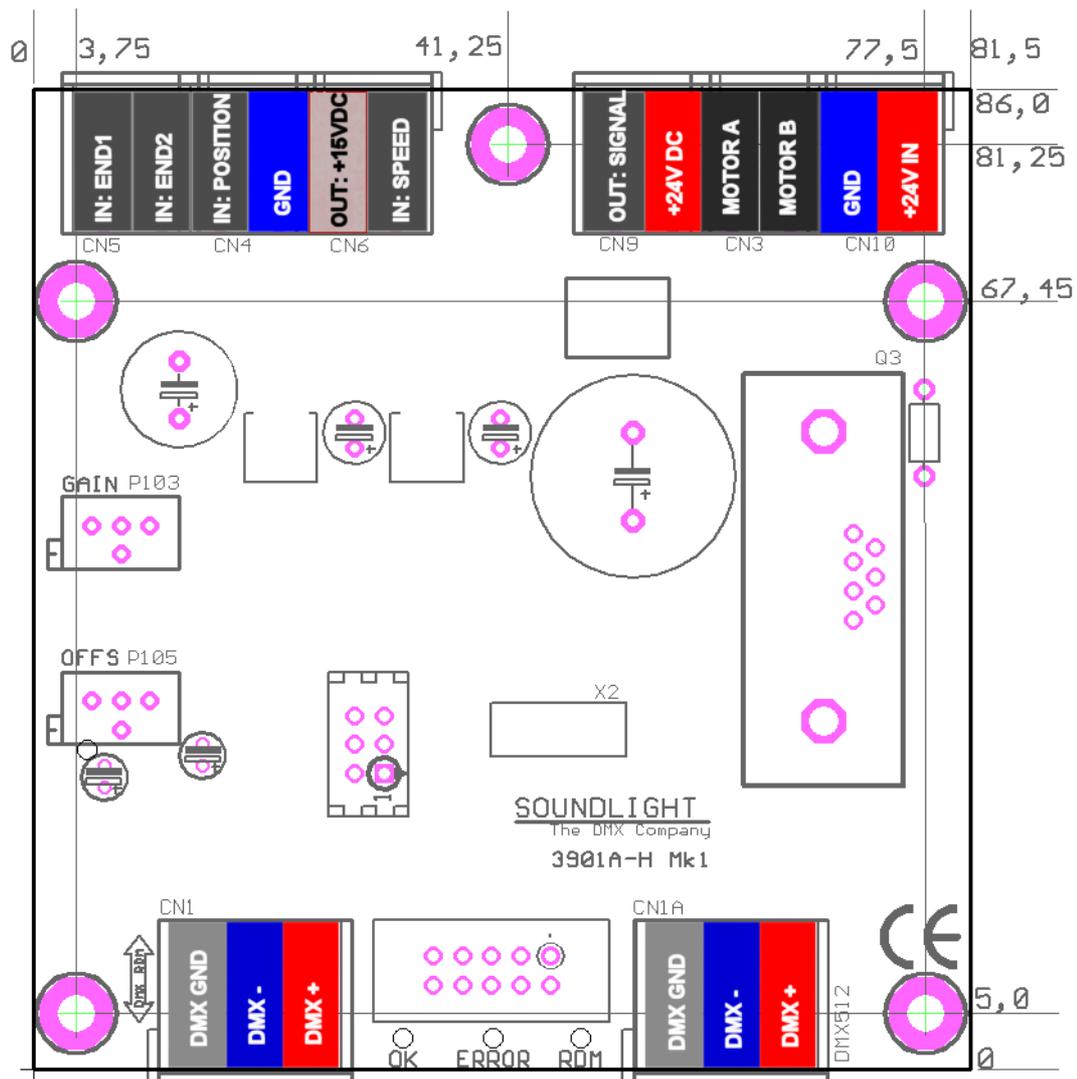
The Motor Controller 3901A-H Mk1 consists of for terminal rows equipped with WAGO cage clamp terminals. T open, press lever gently (using a <u>flat blade</u> screwdriver) , insert wire and release. Stranded wires can be used with or without end ferrules, end ferrules preferred).

All data refer to the layout shown on page 3.

CN1   **DMX INPUT (3-pin)**

1	grey	GND, COMMON
2	blue	-DMX
3	orange	+DMX

CN1A   **DMX OUTPUT (3-pin)**

1	grey	GND, COMMON
2	blue	-DMX
3	orange	+DMX

CN2   **Start Adress Board (10-pin)**

to connet an (optional) SOUNDLIGHT start adress board 3000P, 3003P or 3005P.

CN5/4/6   **Sensor Inputs (6-pin)**

1	light grey	End switch # 1 (left)
2	light grey	End switch # 2 (right)
3	light grey	Sensor input 0...8,4VDC
4	blue	0V, GND
5	white	+15VDC (Referece voltage) out
6	light grey	Speed In (Option)

CN9/3/10   **Power Supply and Motor Output (6-pin)**

1	light grey	Signaling output (Option)
2	red	12/24VDC
3	dark grey	Motor A
4	dark grey	Motor B
5	blue	Power supply 0V, GND
6	red	Power supply 12/24VDC

NOTES:

(1) End Switches
     operate against GND (0V). Contact load is a TTL signal, max. open contact voltage = 5V, max operating current = 2mA. A potential-free contact is recommended. Each end switch only operates in its specific direction to enable to motor to drive out of the end switch area in opposite direction once thre end switch has been engaged.

(2) Reference Voltage
     The reference voltage can be used to supply the position potentiomer (in positioning mode). The reference voltage output can only be used with 24V power supply. Max. load must be limited to 20mA.

(3)   Sensor Input
The position potentiometer wiper must be connected to the sensor input. The useful input voltage range is 0...8.4VDC, with an operation range of about 0.5V...8V recommended (span=7.5V = approx 50% of reference voltage = 180 deg on a 360deg pot). Maximum input voltage must be kept below 15V.

(4)   Signaling
The signaling output features an open collector driver switching to GND.
 Max. load is 24VDC, 1A. The output is only available on special request (Option)

(5)   Motor Output
The motor must only be connected to output terminals A and B. Motor must turn left, when terminal A is positive and terminal B is negative. It must turn right, when terminal A is negative and terminal B is positive. The output is fused with a automatically resetting polyfuse 2.5A.

SIGNAL INDICATORS

The current status of the motor driver is being signalled with three LEDs.

green: OK
A standard DMX signal has been detected.

red: ERROR
normally off
Blinks at data errors or loss of signal.

red-grn: PROGRAMMING
A programming cycle is indicated with 4x red-green blinking

yellow: RDM
illuminated when any DMX address or personality programming has taken place by RDM. Optional start address switches (3000P) will then be blocked. To re-enable address switches, simply set the "hundeds" position (S3) to "9". This will cause a programming cycle and re-enable the external address switches (not ncessary with display start address boards 3003P or 3005P)

START ADDRESS SWITCHES

S3   S2   S1
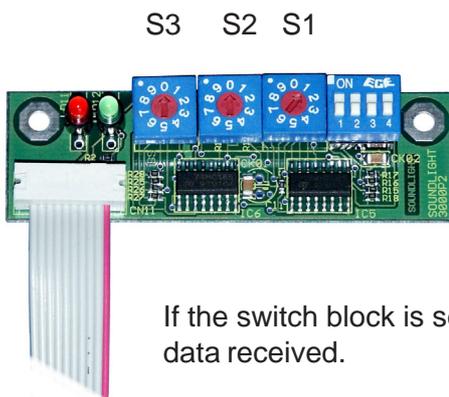
The three decimal coding switches set the start address, that is the address of the first channel to be decoded. The setting is fully decimal, no binary conversion is necessary as is with DIL switches.
S1:   Ones
S2:   Tens
S3:   Hundreds

If the switch block is set to address 000, all outputs are disabled regardless of the data received.

All settings can also be performed by RDM commands, the start address board is fully optional. The unit can be operated with or without start address board attached. Available start address board include type 3000P (switches), type 3003P (LED readout) or 3005P (LCD readout, encoder entry).

A switch start adress board (3000P) will get locked when start address, DMX personaliy or HOLD mode are programmed via DMX RDM. To un-lock the address and DIP switches, simply set the "hundeds" position (S3) to "9". This will cause a programming cycle and re-enable the external address switches (not ncessary with display start address boards 3003P or 3005P)

DIP-SWITCHES

The motor driver functionality can be set using the DIP switches of the start address board 3000P (Functions S1...S4 of start adress boiard 3003P) . Switch assignment:

DIP-SWITCH 1:   **HOLD MODE**
keeps the actual motor position or movement at loss of DMX signal
ON: HOLD Mode activated ("last look")
OFF: Proceed according to DIP switch 2

DIP-SWITCH 2:   **SAFETY LEVEL**
Motor position at signal loss
ON: Motor goes to end position
OFF: Motor goes to start position

DIP-SWITCH 3:   **not used**

DIP-SWITCH 4:   **DMX PERSONALITY**
ON: Personality 2: Endless mode
OFF: Personality 1: Positioning mode

MODES

Modes of operation are also called " DMX PERSONALITY ". The DMX personality can be set via DMX RDM, or via external switches. All settings are retained in nonvolatile memory. Access to DMX personality settings can be blockedusing the LOCK function, and -if requierd- your personal PIN to prevent unauthorized access. Refer to our RDM manual for more information regarding enhanced RDM functions.

PERSONALITY 1: POSITIONING MODE

In positioning mode, the motor rotates until the actual position (reported from the position sensor potentiometer) equals the DMX position. The range is defined by analog sensor voltage and the DMX data range:

Sensor voltage 0V: Start position
                            = DMX value 000
Sensor voltage 8,4V: End position
                            = DMX value 255

DMX values 0 (start position) and 255 (end position) can be assigned to any value within the sensor voltage range - thus the motor driving range can be defined by RDM settings. Use your preferred RDM controller to adjust the total moving range (the controller must be able to support simple manufacturer specific commands). For more information refer to our "RDM-Manual", to be applied for all our RDM equipment. The RDM manual can be found on *http://www.rdm.soundlight.de.*
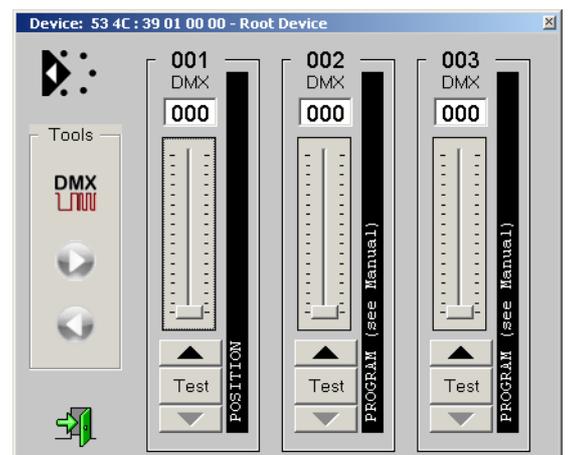
Use thius procedure to set up the motor moving range:
1. Enable DMX HOLD mode first
   Set DIP switch #1 to "ON" or select RDM command "DMX HOLD MODE" with parameter "2".
2. Select the DMX Personality
   Select Personality 1 ("Positioning Mode"). To do so, set DIP-switch 4 to "OFF" or issue the appropriate RDM command.
3. Position the motor
   Starting from the middle of the moving range, slowly adjust the motor to the "start" position.
4. Call RDM function "RANGE LOWER LIMIT" and enter "255" (or "FF" [hexadecimal]) .This will set the current position as Lower Limit. Due to the offset to the "absolute zero" the motor will move forward marginally.
5. Adjust the DMX input to reach the upper position.
6. Call RDM function "RANGE UPPER LIMIT" and enter value "255" (or "FF" [hexadecimal]). This will set the current position as Upper Limit. Due to the offset to the "maximum value" the motor will move backward marginally.
7. When needed, lock the access to the configuration commands using LOCK MODE 2. you may also set your own defined PIN to restrict access to these settings.

   IMPORTANT NOTE! Make sure to remember your PIN at all times. You will NEVER get access to these functions again if no valid PIN can be presented.

If your RDM controller does not support manufacturer specific commands, you may alternatively use DMX PERSONALITY #3 (see below) to enter the moving range parameters.

DMX PERSONALITY 2: ENDLESS MODE

This mode uses two DMX slots:

1. Start Command (OFF / RIGHT / LEFT)
0....12%	OFF
12%....50%	RIGHT
51%...100%	LEFT

2. Speed   0...100%

DMX PERSONALITY 3: CONFIGURATION MODE

Thgie mode resembles the positiong mode (mode #1), but has been enhanced with two additional DMX data slots to program the moving range. Use this personality only for setup purposes, not for standard operation!

To set the moving range, proceed as follows:
1. Use DMX data slot 1 to go to the lower (start) point.
2. Set DMX data slot #2 to any value between 50 and 80 (20%...30%).
3. Set DMX data slot #3 shortly to 255 (100%) - position will be programmed. Motor may move.
4. Set all DMX data slots to 000 (important! to enable next programming step)

Then set the upper moving end point:
5. Use DMX data slot 1 to go to the upper (end) point.
6. Set DMX data slot #2 to any value between 180 and 200 (70%...80%).
7. Set DMX data slot #3 shortly to 255 (100%) - position will be programmed. Motor may move.
8. Set all DMX data slots to 000 (important! to enable next programming step)

If any or both positions have been programmed erroneously, no useful moving range may result. In this case, the decoder can be reset to factory defaults (full range). Proceed as follows:

9. Set DMX data slot #1 to 000.
10. Set DMX data slot to 255 (100%).
11. Set DMX data slot #3 shortly to 255 (100%) - default will be programmed. Motor may move.
12. Set all DMX data slots to 000 (important! to enable next programming step)

DMX PERSONALITY 4: ENDLESS MODE - EXTERNAL SPEED CONTROL

Setting DMX Personality 4 enables the external SPEED input as SPEED channel. The external control signal (0...+5VDC) sets the speed from 0% (0V) to 100%(5V).

By default, the input is tied to 5V with a 100k resistor. Thus the unused (unconnected) input will always gerenate full speed. What's more, a simple variable resistor is enough to control speed (e.g. connect 100kOhm to GND -> 50% speed)

DMX RDM Properties

The DC Motor Driver 3901A-H RDM complies to ANSI E1.20 DMX RDM Standard 1.0. The unit will be identified as MOTOR ROTATOR , category SCENIC DEVICES. It may be operated in two basic operating modes:
    - Positioning Mode (1 DMX data slot)
    The motor will adjust itself to match actual position with DMX data input. The maximum resolution is 8 bits.
    - Continuous Mode (2 DMX data slots)
    Direction and speed are controlled by 2 DMX data slots.

Select the appropriate mode by selecting the DMX512 Personality.

Special RDM functions:
RESET_DEVICE: Call using parameter =1 generates a "soft" reset
                                           Call using parameter = 255 generates a "hard" reset
DEVICE_POWER_CYCLES: Reads the number of device startups

The DC motor driver uses some specific funtions, available as manufacturer specific commands.

FUNCTION C003   RANGE LOWER LIMIT

This function defines the "lower limit" in positioning mode. The function is only available in positioning mode.

Call: GET <param = none> (no parameter necessary)
            Response: <param=Limit_Lo [Byte]>

            SET <param=Limit_Lo [Byte]>
            Response: <param=none> (no parameter available)

            Limit_Lo = $00...$FE   writes the given parameter as lower limit value
            Limit_Lo = $FF   writes the actual position as lower limit value

FUNCTION   C004   RANGE UPPER LIMIT

This function defines the "upper limit" in positioning mode. The function is only available in positioning mode.

Aufrufe: GET <param = none> (no parameter necessary)
             Response: <param=Limit_Hi [Byte]>

             SET <param=Limit_Hi [Byte]>
             Response: <param=none> (no parameter available)

             Limit_Hi = $00...$FE   writes the given parameter as upper limit value
             Limit_Hi = $FF   writes the actual position as upper limit value

SENSORS

Multiple Sensors can be read via DMX RDM.

| Sensor 1:	Sensor 2:	Sensor 3:
Power supply voltage	Decoder temperature	Motor voltage
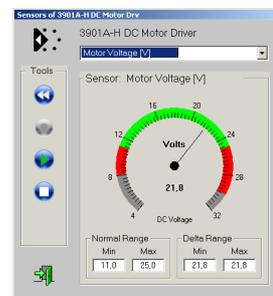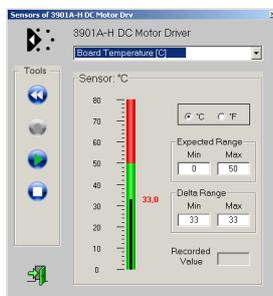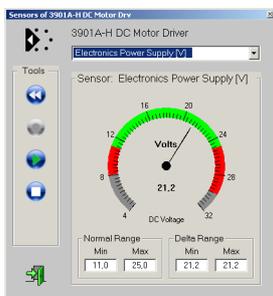
Sensor 4:	Sensor 5:
Position input	Speed Input
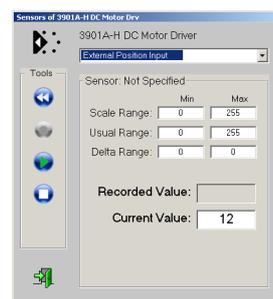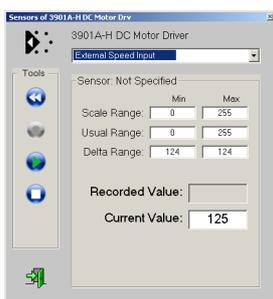
Sensors 4 and 5 are provided for information purposes only. They assist in setup and maintenance.

LOSS OF SIGNAL

When no valid DMX data are received within 1250ms (1 $\frac{1}{4}$ seconds), the decoder assumes a loss of control signal and acts as defined with DIP switch 1/2 settings (see DMX HOLD properties, or see page 6). The red status LED will start blinking.

TECHNICAL DATA

Dimensions: Printed Circuit Board: 81,5 x 86mm
                        DIN rail module: 5TE (width units)
Power Supply: 24V DC 35mA without load
DMX IN: 1 Unit Load
DMX OUT: fed thru
Position IN: 0...8,4V (max. 15V DC)
End Switch IN: 0,0V (potential free contact or Open Collector TTL), approx. -2mA
                        Ruhespannung 5V DC
Reference Out: 15,0V DC +/- 5%, max. 25mA
Motor Out: 0...+24V, max. 2,5A
Operating Temp.:   0...+50C
Order Code.:   3901A-H

Disturbances

If a trouble-free operation cannot be guaranteed, disconnect the decoder interface and secure it against unwanted operation. This is especially necessary, when
- the unit has visible damages;
- the unit does not operate;
- internal parts are loose;
- connection cables show visible damages.

CE Marking

The unit has been tested in our lab and has been marked to comply with CE requirements. To ensure compliance, use grounded power leads only and make sure that properly shielded data lines (CAT5, DMX data cable or Digital Audio cable to AES/EBU specifications) are used. Any modifications not approved by the manufacturer may void CE compliance.

FCC STATEMENT

This product has been tested and complies with the specifications for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

      • Reorient or relocate the receiving antenna
      • Increase the separation between the equipment or devices
      • Connect the equipment to an outlet other than the receiver's
      • Consult a dealer or an experienced radio/TV technician for assistance

FCC Caution: Any change or modification to the product not expressly approved by SLH could void the user's authority to operate the device.

Limited Warranty

This instrument ist warranted against defects in metarials and workmanship for a period of 12 month, beginning with the date of purchase. The warranty is limited to repair or exchange of the hardware product; no further liability is assumed. SOUNDLIGHT is not responsible for damages or for loss of data, sales or profit which arise from usage or breakdown of the hardware product. In germany, SOUNDLIGHT will repair or replace established defects in hardware, provided that the defective part is sent in, freight paid, through the responsible dealer along with warranty card and/or sales receipt prior to expiration of warranty.

Warranty is void:
- when modifying or trying to repair the unit without authorisation;
- modification of the circuitry;
- damages by interference of other persons;
- operation which is not in arccordance with the manual;
- connection to wrong voltage or current;
- misuse.

Service

There are no parts within the DMX DC Motor Controller 3901A-H which require the user's attention. Should your unit require servicing, please send it to the factory, freight paid.

Internet-Hotline

Please check our internet domain **http://www.soundlight.de** for new versions, updates etc. If you have any comments which may be worth considering, please send a message to ***support@soundlight.de***. We will check your message and reply accordingly.

End-of-Liftetime Procedures

Electronic devices are not domestic waste and must be disposed of properly. If the end of lifetime of this device has been reached, it must be recycled by your local WEEE recycling system.
SOUNDLIGHT is a WEEE registered company (registration code DE-58883929)

These schematics show a typical configuration of the 3901A-H DC motor controller. These are examples only; specific wiring requirements may vary due to system layout.
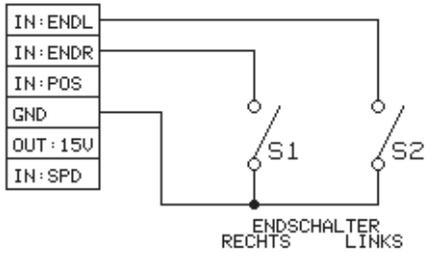
End switch configuration (contact or OC TTL)
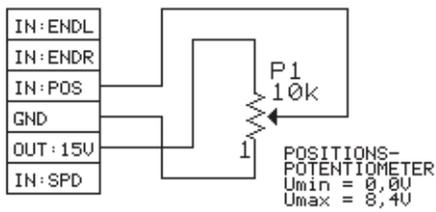
Position input (position potentiometer)
(Voltage must increase when motor moves from start to end position)
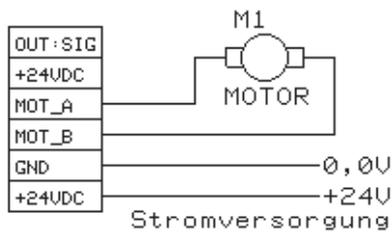
Power supply and motor connection