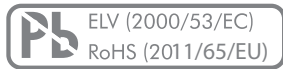


MAIN FEATURES

IR CONTROLLED MOTOR DRIVER KIT FOR ELMA'S TYPE A4, A47 AND O4 SWITCHES

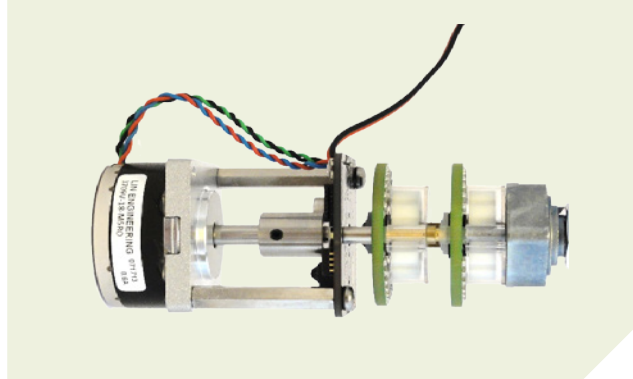
- IR remote controlled with IR teach-in function
- Adjustable to different switch types
- Push button and host control remote options
- Relay mute function
- Zero EMI emission when not actuated
- Switch feel virtually not affected by motor (LIN motor option)



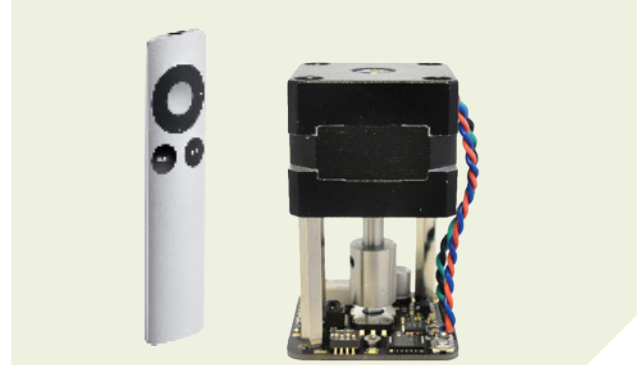
POSSIBLE CUSTOMIZATIONS

- Software design (including I/Os, I2C, SPI or async interfacing)
- RF vs. IR remote control option (on-board UHF module)
- Motor options, including DC motors
- Adaptors for other supplier's switches

REMOTE AUDIO PLUS (WITH LIN-Motor)



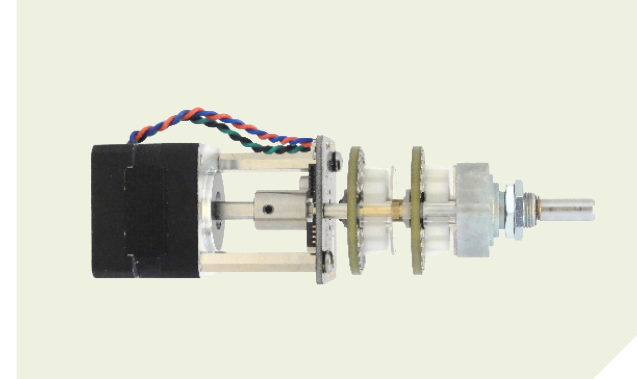
REMOTE AUDIO PLUS



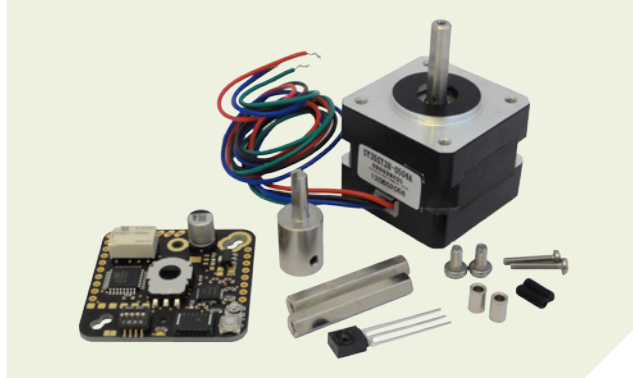
APPLICATIONS

- High-end audio & Pro audio
- Industrial controls

STANDARD VERSION (WITH A 2-WAFER SWITCH)

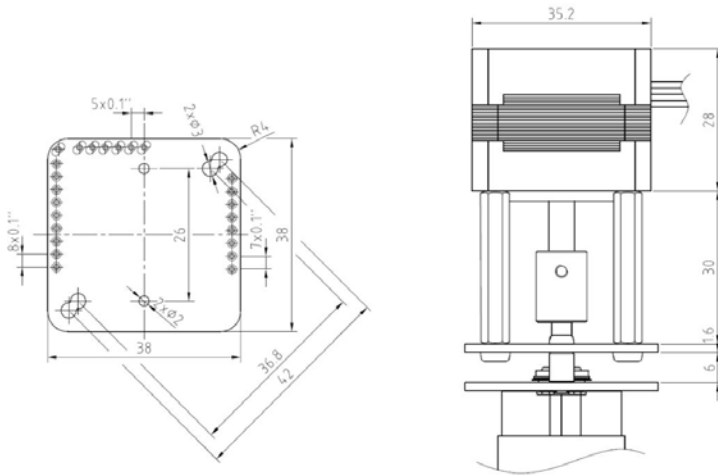


KIT CONTENT

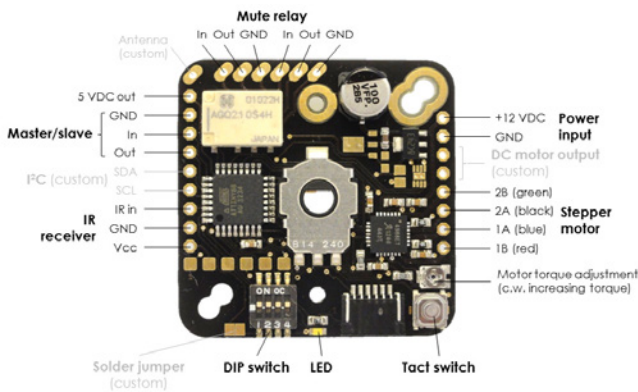


Switch and IR remote unit are not included

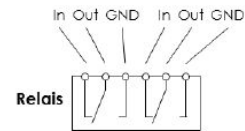
DIMENSIONS [in mm, unless otherwise stated]



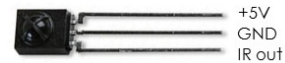
CONTROL MODULE (pin allocation, operating controls and LED)



RELAY FUNCTION



IR RECEIVER



SPECIFICATIONS

CONTROL MODULE

Operating voltage:	8 to 15 VDC (12 VDC nominal)
Current consumption:	Standard motor; 1.2 A peak ¹ max., LIN motor; 2.4 A peak ¹ max. (at 12 VDC and max. torque) 20 mA stand-by max. (at 12 VDC, no motor operation, without display module)
5 VDC output:	Regulated, 100 mA load max.
Switch torque capacity:	Standard motor; 6 Ncm max., LIN motor; 10 Ncm max. (limitable by trim pot, at 12 VDC)
Indexing resolution:	12, 24 or 48 (47) positions
SER interface:	Single pulse PPM (low-active); up; 500 µs, down; 1 ms, mute on; 2 ms, mute off; 4 ms (all +/- 20%) Single pulse PPM (low-active); "up"; 500 µs, "down"; 1 ms, "mute on"; 2 ms, "mute off"; 4 ms (receiver tolerance +/- 20%)
IR input:	NEC protocol (included IR receiver; Sharp, P/N GP1UX311QS)

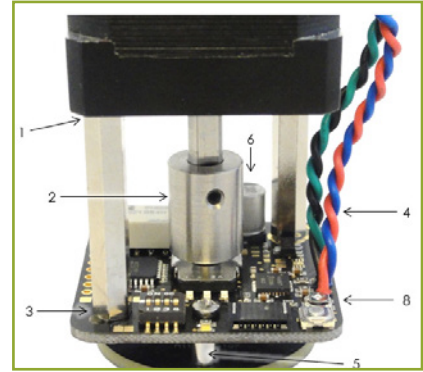
IR REMOTE UNIT

7 buttons; "up", "down", "left", "right", "center", "menu", "play/pause". 38 kHz burst frequency, NEC protocol. Battery type: CR2032

¹ Using a 6'800 µF input buffer capacitor will reduce the peak current requirement to approx. 50%

ASSEMBLING THE KIT

1. Mount the two 30 mm stand-offs to the stepper motor using the two set screws (do not tighten the set screws).
2. Feed the switch drive linkage onto the shaft of the stepper motor (do not tighten).
3. Assemble the stepper motor with its stand-offs and the linkage onto the control module using the two M3 screws (be careful when feeding the linkage thru the position sensor in the middle of the control module).
4. Twist together the stepper motor's wires (blue with red, green with black) and solder them to the control module (see pin allocation).
5. Mount the assembled motor unit onto the rotary switch using the two M2 screws and the spacers (replacing the original M2 screws at the rear end of the switch).
6. Position the linkage to the switch and firmly tighten the set screw of the linkage.
7. Mount the switch/motor unit into your equipment and connect IR remote cables and 12 VDC power supply to the unit (see pin allocation).
8. Adjust the trim pot to max. position, follow the below setup procedure and finally adjust the trim pot to the minimum torque level needed.



SETUP BY DIP SWITCH

- Switch# 1 - 12 / 24 pos; select between 12 or 24 positions
 Switch# 2 - 12/24 / 48 (47) pos; select between 12/24 or 48 positions
 (if 48 pos is selected, switch # 1 is overridden)
 Switch# 3 - Std mot. / LIN mot.; select the corresponding stepper motor type in use
 Switch# 4 - Slow / Fast; chose either slow or fast switching speed



END-STOP CALIBRATION AND IR TEACH-IN USING THE TACT SWITCH

1. Push the tact switch until the LED flashes for approx. 1 sec.
2. Turn the switch to the fully right position and quickly push the tact switch. The LED flashes for approx. 300 msec. for confirmation.
3. Turn the switch to the fully left position and quickly/long push the tact switch. Quick push; the LED flashes for approx. 300 msec. for confirmation. Long push; jumping to # 5 (used when no IR receiver connected, e.g. in slave mode).
4. Quickly operate the buttons on the IR remote unit in the exact sequence of "up", "down", "mute", "left" and "right".
5. End of procedure (the LED bursts for approx. 1 sec.).



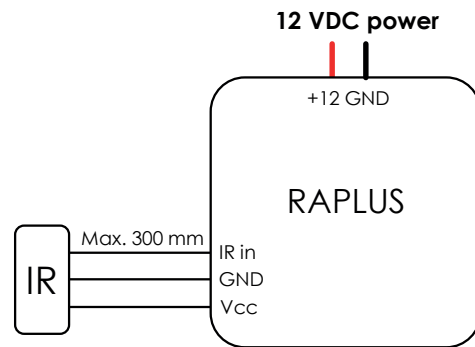
IMPORTANT

- Avoid fluorescent light exposure during teach-in.
- If the teach-in process fails, repeat it after briefly disconnect the unit from power.
- IR remotes output unique codes; they only work with the originally-paired unit.

APPLICATION EXAMPLES

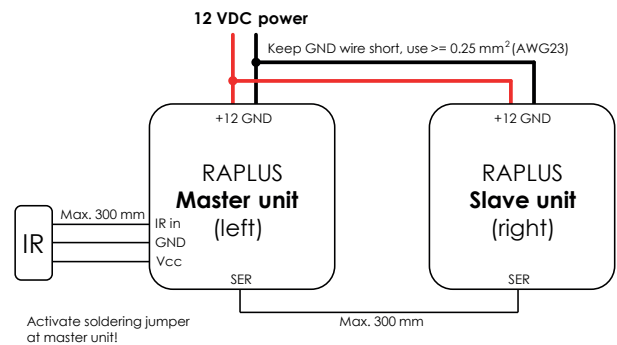
#1 - CLASSIC SINGLE UNIT OPERATION

The classic mode of operation incorporates a single unit that is either manually or IR controlled. The versatile control module can be adjusted to individual endstop positions, switch resolutions and operating speeds. Any type of NEC compliant IR protocol can be used and "taught in". The power requirements are 12 VDC nominal at 1.2 A (2.4 A with LIN motor) peak current (see specifications). The supplied IR receiver can be directly connected to the control module using an unshielded 3-wire cable with maximum length of 300 mm. Assembling and setup needs to be done as described above. An IR controllable on-board audio mute relay may optionally be wired in the audio path as indicated under pin allocation.



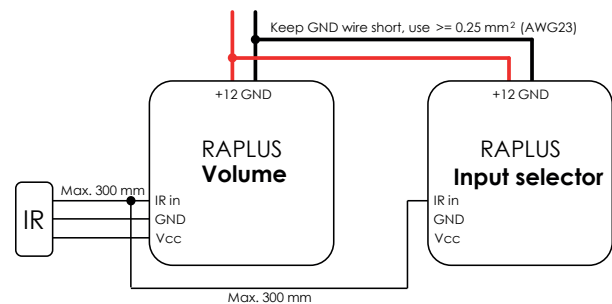
#2 - MASTER/SLAVE OPERATION (BALANCE CONTROL)

When using two units in a balance configuration, left and right channels are attenuated with two independent units, with two independent switches. Connect the units in the master/slave configuration as shown. When operating the balance function using the IR remote, the two units will switch alternately in order to minimize the balance step size. The balance function needs to be enabled by activating the solder jumper (see picture) of the PC board of the control unit. The teach-in procedure has to be applied to both, master and slave units, whereas for slave unit the IR teach-in procedure is obsolete.



#3 - TWIN UNIT OPERATION (VOLUME & INPUT SELECTION)

For both volume and input source selection two independent RAPLUS units can be used, wired to the same IR receiver. The volume control unit is set up as described under # 1 above, whereas the 2nd unit controlling the input selection will be taught in with the same IR control but using left and right buttons instead of up and down (the teach-in sequence follows the order of "right", "left", "center", "up", "down").

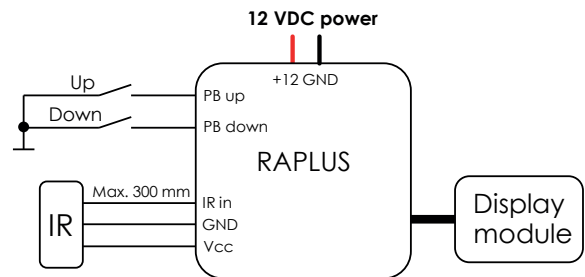


APPLICATION EXAMPLES

#4 - PUSH BUTTON CONTROL AND DISPLAY OPERATION

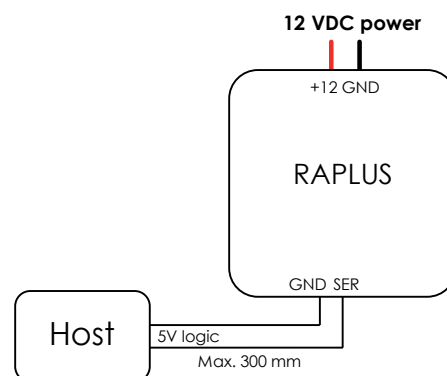
The unit can also be controlled by separate up and down buttons instead of turning the rotary switch manually. This way the assembled RAPLUS/switch combination does not need to be attached to the front panel, but can be placed anywhere in the chassis and operated in a completely wired mode. For level indication, Elma's Display Module is available as an accessory. The Display Module is a two-digit white LED board that can easily be connected to the RAPLUS control module using an FFC cable. Please refer to the corresponding data sheet for instructions.

When using the display module the unit should not be operated manually as there is no switch position sensor available that keeps the display module on track.



#5 - HOST SYSTEM CONTROL

Instead of using direct push button controls the unit may be remotely controlled by a host system, either by connecting the host system to the push button inputs ("up" and "down"), or by the SER interface for controlling "up", "down" and "mute" (see specifications for the PPM pulse width coding). Level indication can be provided using the Display Module or directly by the host systems own display solution.



ORDERING CODE

Remote Audio PLUS: **RAPLUS**

Remote Audio PLUS (with LIN² motor): **RAPLUS-LIN**

IR remote unit: **IRREMOTE**

Standard motor (spare part): **STEPMOT1**

LIN motor (spare part): **STEPMOT2**

Control module (spare part): **RAMOD**

IR receiver (spare part): **IRRX**

² The LIN motor virtually does not affect the switch feel due to very little indexing and a high resolution of 400 vs. 200 steps (standard motor).

Furthermore the LIN provides a substantially higher torque capacity at a correspondingly higher current requirement (see spec).