

Elliptec MR40S ROTARY UNIT Data Sheet Part Number: MR40S-HR-002

Features

- Piezoelectric motor technology
- Integrated control electronics and position sensor
- 1200 steps / revolution
- Fast response times
- Compact form factor and simple mechanical mounting

General Description

The MR40S ROTARY UNIT is a fully integrated rotary motion solution for Elliptec’s piezoelectric motor technology. The module contains an actuated $\varnothing 20\text{mm}$ wheel, the complete motor control electronics with position feedback and an integrated UART interface.



Mechanical and Electrical Specification

($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Parameter	Ratings			Unit
	min.	typ.	max.	
Motor	Elliptec X15G			
Unpowered Holding Torque	5	8		mNm
No-Load Speed	500	720		$^\circ/\text{s}$
Motor Driving Torque	Figure 1			
Supply Voltage	4,5	5	5,5	V
Supply Current		0,45	0,9	A
Peak Current			1,5	A
Optimal Ambient Temperature		25		$^\circ\text{C}$

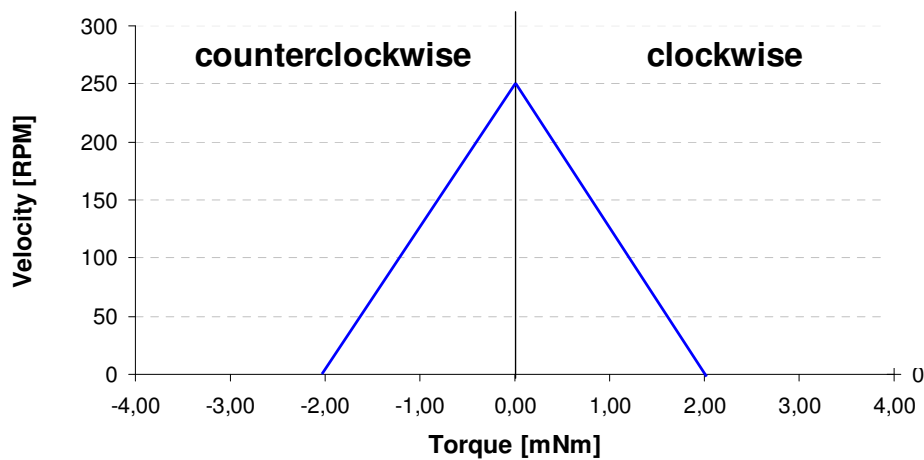


Figure 1 Typical velocity and torque characteristics

Connector Pin Assignments

Pin No.	Name	Description
1	GND	supply voltage (Ground)
2	µC1	optional input/output pin/ encoder A ¹⁾
3	UART TX	serial output from device
4	UART RX	serial input to device
5	µC2	optional input/output pin/ encoder B ¹⁾
6	VCC	supply voltage (5V)

¹⁾ For customized firmware and encoder signals, please contact info@elliptec.de

Serial Commands to Module:

The module is controlled through a serial connection.

Baud rate: 19200 Baud
 Stop bits: 1
 Parity: no parity
 Flow control: none
 Voltage level: 0...3.3V

RS232 standard voltage levels (-30V ...+30V) have to be converted to LVTTTL levels (0V...3.3V) or the unit will be damaged. A Command consists of 14 ASCII characters (according to ANSI X3.4-1968) and can be sent by any terminal program or any application that supports the protocol.

05	Command preamble
K	Command code
PPPPP	Basic parameters
OOOO	Additional parameter
ZZ	Not used parameter for future use
B	postamble

05KPPPPP0000ZB

Command	Code [K]	Parameters [PPPPP]	additional parameters [OOOO]
Send Com Port	0	XXXXX	XXXX
Start frequency search	1	XXXXX	XXXX
Move to zero position	2	XXXXX	XXXX
Turn clockwise for indicated period of time	3	[0000X...9999X]*	XXXX
Turn counterclockwise for indicated period of time	4	[0000X...9999X]*	XXXX
Turn to absolute position	5	[00000...65536]**	[0000...1199]**
Send current position	6	XXXX	XXXX

X = any ASCII character

* = increments in 100µs steps

***) Position is set by number of revolutions and angular position in 0.3° steps

Calculate revolution parameter [PPPPP] when turning clockwise:

$$[PPPPP] = 32767 + \text{revolutions}$$

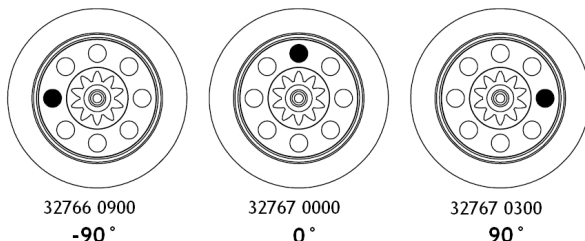
Calculate revolution parameter [PPPPP] when turning counter clockwise:

$$[PPPPP] = 32767 - \text{revolutions}$$

Calculate parameter [OOOO] for angular position [X°]:

$$[OOOO] = 1200 \cdot \frac{X^\circ}{360^\circ}$$

For positioning at 0° or 360° always use X° = 0°



The value of the counter consists of two sections: first section counts complete revolutions, second section indicates the actual angle. After start or reset the counter is set to zero [revolution: 32767 angle: 0000].

Passing the zero position counter-clockwise by one increment, the revolution counter is decremented to 32766 while the angular position is set from 0000 to 1199. When passing the zero position after one complete clockwise turn, the revolution counter is incremented and the angular counter is set from 1199 to 0000 again. The figure shows the counter in -90°, 0° and 90°.

Example 1:

To move the rotor to position 180,3° (0 revolution and 180,3°) clockwise send:

`„055327670601XB”` (unit turns 180,3°)

Example 2:

To move the rotor to position 180,3° counterclockwise send (-1 revolution and 180,3°):

`„055327660601XB”` (unit turns 179,7°)

Example 3:

To move the rotor clockwise for 0.5 seconds (=5000 · 100µs) send:

`„0535000XXXXXXB”`

UART Responses from Module:

After receiving any one of the command codes 1...6 the module returns an ANSI character string of integers separated by semi-colons followed by the string literal 'Eot':

`fwd_f;bwd_f;new_pos_rev; new_pos_fine;curr_pos_rev;curr_pos_fine;time;errEot`

[fwd_f] Forward frequency: Motor frequency = 16 000 kHz / fwd_f.

[bwd_f] Backward frequency: Motor frequency = 16 000 kHz / bwd_f.

[new_pos_rev] Target revolutions: only valid for command #5 [integer]

[new_pos_fine] Target position fine: only valid for command #5 [integer]

[curr_pos_rev] Current revolutions: [integer]

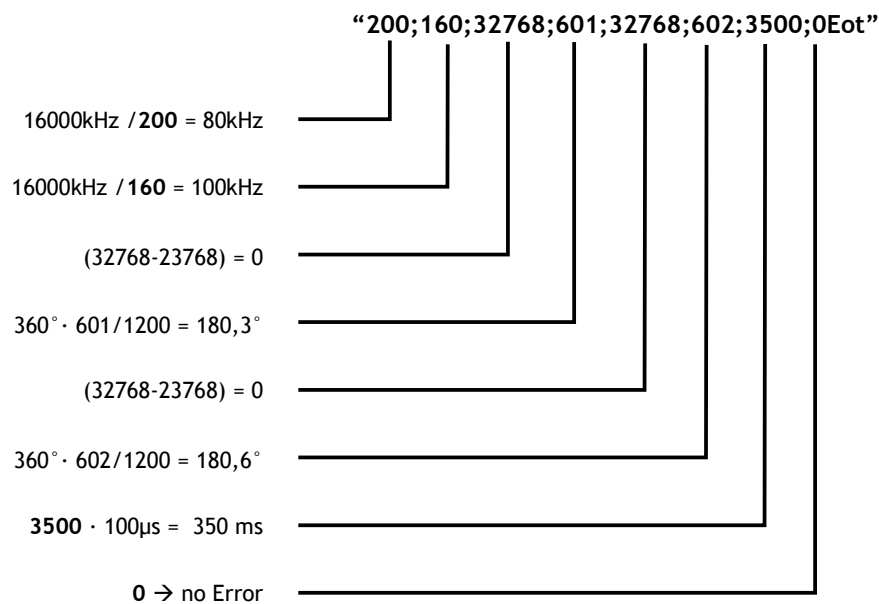
[curr_pos_fine] Current slider position fine: [integer]

[time] Time of travel: time needed to move to current position [100µs]

[errEot] Error: Error indicator [0: no error, 1: error] An error occurs when a user command could not be executed.

Example:

After the command string `„055327680601XB”` is sent and it has been executed, a possible response from the module is:



Electrical Connector

The electrical connector is compatible with SHR-10V-S-B

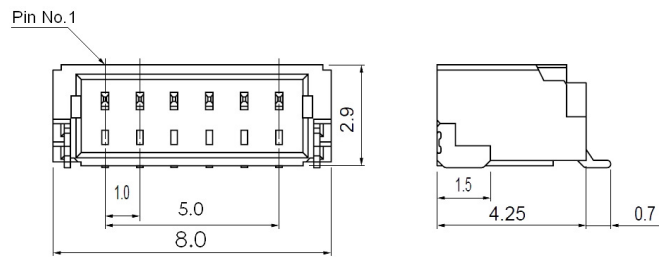


Figure 2: Location of connector pins (Dimensions mm)

Physical Dimensions

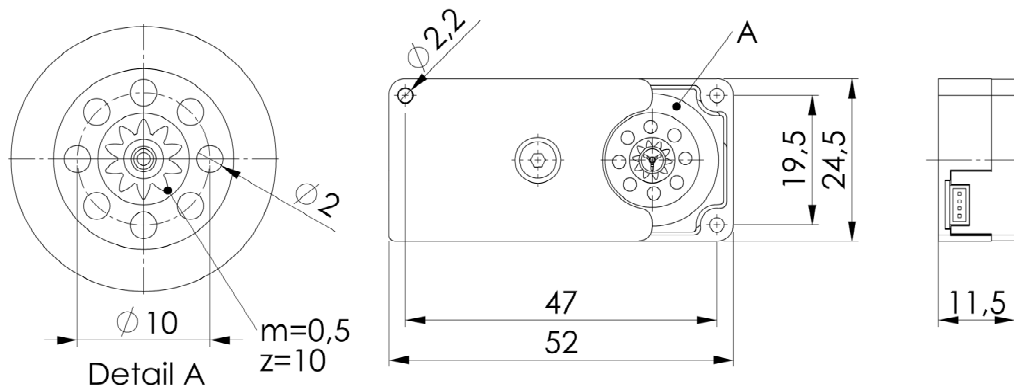


Figure 3: Dimensions in mm

Ordering information: MR40S-01-002

Appendix

Trademarks

Elliptec™, Elliptec Motor™, Elliptec Minimotor™, Elliptec Actuator™, Elliptec Module™, Elliptec Controller™ are trademarks of Elliptec Resonant Actuator AG.

Attention

The preloaded software and hardware is not suitable for climate tests, please contact Elliptec when required.

For further information please visit our website at www.elliptec.com

All information subject to change without notice.

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