Eid 50 Controller

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«A versatile Azimuth and Elevation rotator system built on open source software and hardware»

Introduction

EID50

EID50 is an Azimuth and Elevation rotator controller.

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Arduino

The rotator controller are based on an Arduino Mega 2560 and two H-bridge modules to control the DC motors. The H-bridges are capable of handling up to 43 amp. The absolute maximum voltage is 27 Volt dc. A real time clock is built into the main board together with a small switch mode power to supply the internal system. The main board is also supplied with two RS232C serial ports. One as a spare for future options and the other is configured in the software to handle NMEA sentences from an external GPS.

Communication parameters are 4800 N81.

K3NG

Anthony Good has written open source rotator controller software, and he has granted us permission to use his software in this product. The software is higly configurable and we have adapted it to fit our needs in such a controller.

Software

There are two software packages. The one used in the controller itself is K3NG rotator controller and a small control program to be run on a PC or a Raspberry Pi 3, acting as a user interface and utility tool to do configurations and adaptions available to the user..

Hardware

The schematic diagram is also open source, and is available at

https://english.eidolon.no.

Copyright

Updated software to be found at:

https://github.com/k3ng/k3ng_rotator_controller

Updatet schematic diagram hardware options and configuration changes to be found at

http://english.eidolon.no

Features

- Azimuth only and azimuth / elevation rotator support
- Serial interface using the standard Arduino USB port with option for WiFi and remote access.
- Control Port Protocol Support:

  Yaesu GS-232A , Yaesu GS-232B or Easycom.
- LCD display 4 lines x 20 characters
- Directional indication on LCD display (North, South, North Northwest, etc.) along with degrees
- Intelligent automatic rotation (utilizes overlap)
- 450 degree azimuth rotator with stop on 180 deg.
- North Center and South Center support
- Support for any starting point (fully clockwise)
- Optional automatic azimuthal rotation slowdown feature when reaching target azimuth
- Optional rotation slow start (with smooth ramp up)
- AZ and EL preset rotary encoder and start button.
- Buttons with light for CW and CCW , Up and Down rotation.
- Command timeout
- Timeout delay to ensure non continiuos ratation
- Overlap LED Indicator
- Preset Control using rotary encoders with preset start button
- Optional tenth of a degree support with Easycom protocol (i.e. 123.4 degrees)
- Button for automatic moon tracking.
- Button for automatic sun tracking.

Features

- Button for calibrating to sun / moon.
- Interface to GPS and GPS synchronzation
- Realtime clock module.
- Can be operated from Ham Radio DeLuxe and other programs using the above Yaesu interfaces and Easycom.

Theory of operation

The rotator controller reads pulses from the azimuth and elevation motors, and keeps track of the headings during operation. The headings can be accessed via a serial interface called the control port, when queried. The controller rotates the azimuth and elevation when commanded via the control port. The controller can be commanded for manual rotation (left, right, up, and down) or be commanded to rotate to a target azimuth and elevation. An LCD display headings and various status messages. Human interface controls such as buttons, potentiometers, and rotary encoders are added to control rotation.

Calibration

The controller has to be calibrated. This is not an “once and for ever” calibration. Due to the feedback system from the DC motors, this has to be done now an then, depending of how much the system is used. The only feedback from the DC motors are pulses, about 5000 per 360 degrees turning. There are only pulses, and no direction signal. The counting mechanism could be corrupted and the indication of direction will be wrong. It’s easy to calibrate the unit, and this could be done manually or (almost) automatic.

Manual Heading Calibration

The azimuth and elevation can be manually calibrated using the \A and \B commands, respectively. For example, to calibrate the azimuth:

\A175.3

This feature is not intended to be a replacement for calibration using the Yaesu GS-232 emulation O and F commands for the potentiometer sensors, but is intended for tweaking of calibration during a session. In this system we have rotary encoders without a Z pulse and pulse inputs where the position is not absolute (not deterministically known at power up), the \A and \B commands may often needed to maintain accuracy.

Manual calibration with “Utility”-page – Control program

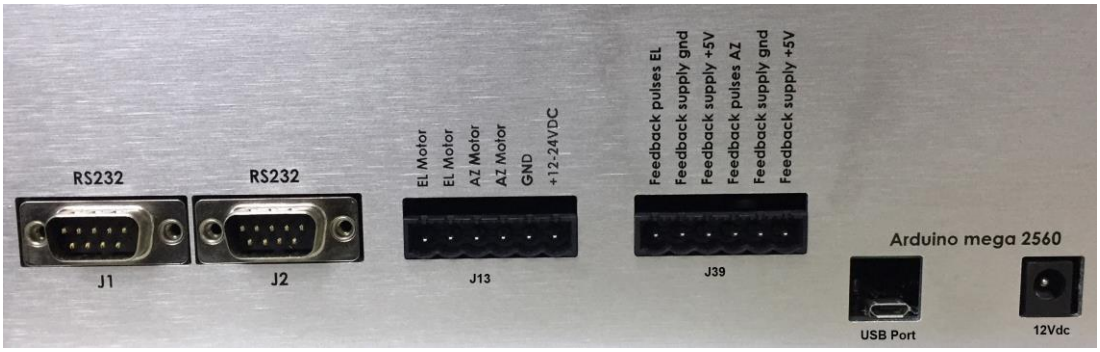
With the buttons on the rotator controller, point the antenna to a known direction. Connect a PC/Raspberry Pi to the control input at the rear. Start the control program and use the “Calibrate AZ”/”Calibrate EL” at the “Utility”-page. That’s it!

Heading calibration using Sun or Moon Position

The azimuth and elevation can be calibrated to the current sun or moon position using the \XS and \XM commands, if the sun or moon is visible. This feature is intended to be used by manually rotating an antenna towards the sun or moon and peaking for maximum solar noise or EME signals, and then executing the appropriate command. The rotator clock must be accurately set to Zulu time for this feature to work accurately.

Connections

Cable connections and requirements



J13

Eid50 controller DC rotor motor

J13 pin 1 EL Motor ↔ pin 1 (black) EL dc motor –

J13 pin 2 EL Motor ↔ pin 2 (red) EL dc motor +

J13 pin 3 AZ Motor ↔ pin 1 (black) AZ dc motor –

J13 pin 4 AZ Motor ↔ pin 2 (red) AZ dc motor +

J13 pin 5 GND ↔ 12-24Volt dc – (gnd)

J13 pin 6 +(12-24)VDC ↔ +(12-24)VDC (min. 4amp.)

J39

J39 pin 1 Feedback pulses EL ↔ pin 5 (blue) Hall A (EL dc motor)

J39 pin 2 Feedback supply gnd ↔ pin 3 (gray) Hall – (EL dc motor)

J39 pin 3 Feedback supply +5Vdc ↔ pin 4 (brown) Hall + (EL dc motor)

J39 pin 4 Feedback pulses AZ ↔ pin 5 (blue) Hall A (AZ dc motor)

J39 pin 5 Feedback supply gnd ↔ pin 3 (gray) Hall – (AZ dc motor)

J39 pin 6 Feedback supply +5Vdc ↔ pin 4 (brown) Hall + (AZ dc motor)

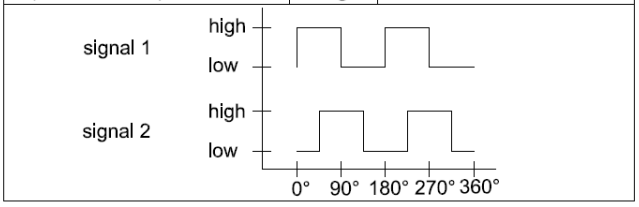
Connections

The rotator dc motors have the following pin connections :

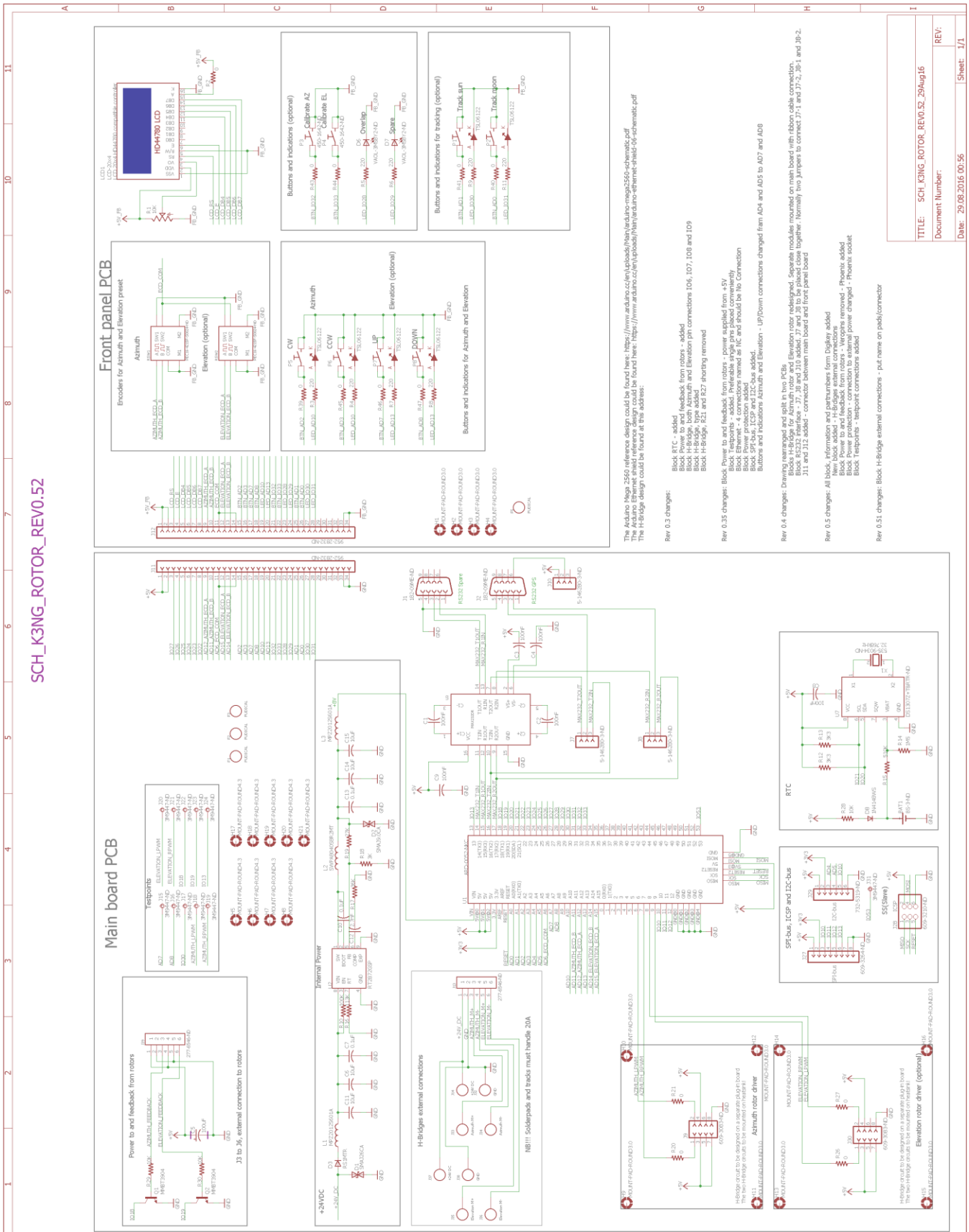
Connections are identical for both EL and AZ motors

Pin 1 (black) motor —
Pin 2 (red) motor +
Pin 3 (gray) Hall —
Pin 4 (brown) Hall +
Pin 5 (blue) Hall A
Pin 6 (orange) Hall B
Pin E (green) GND

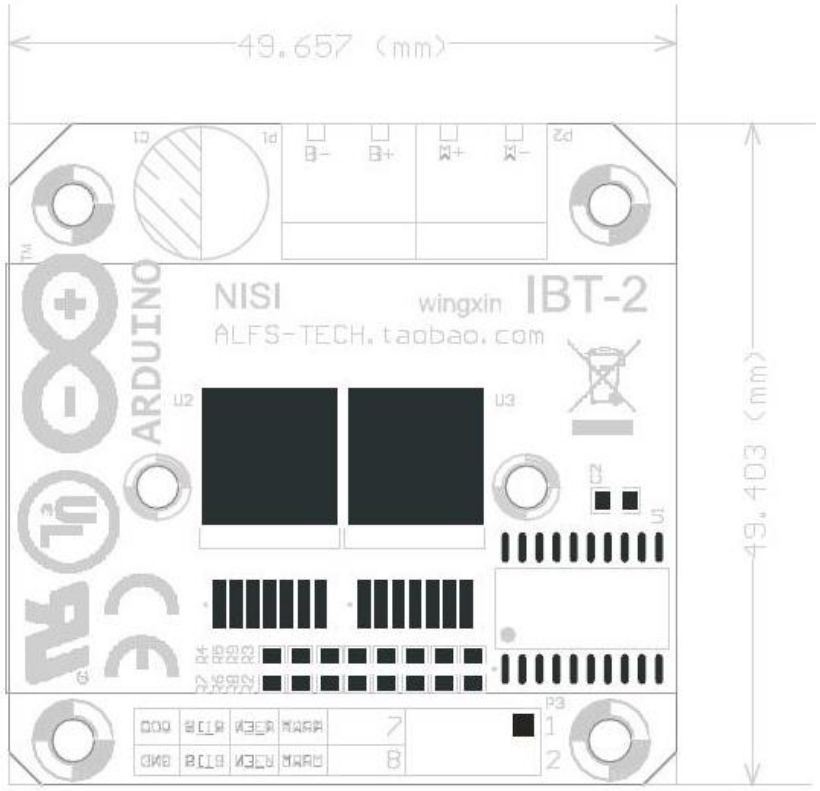
MAGNETIC PULSE GENERATOR DATA		
Output type	-	voltage output
pull-up resistor	-	yes
Output signal	-	2 square wave signals
Phase quadrature	-	90°
Impulses per revolution	ppr	2,channels A and B
Operating voltage	VDC	UN=12(5... 24)
Operating current	mA	max. 12 (U=12V)
Deviation of pulse width	-	max. 15°
Deviation of phase shift	-	max. 15°
Output voltage(low level)	VDC	max. 0.4 (20mA)
SIGNAL RISE TIME	ns	85
SIGNAL DECAY TIME	ns	60
Operation temperature	℃	-40 ... +85

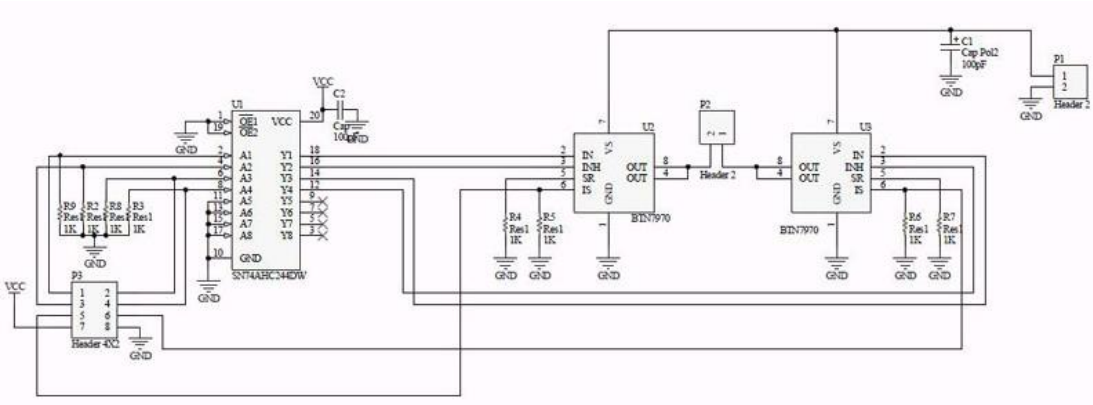


Sch. circuit diagram

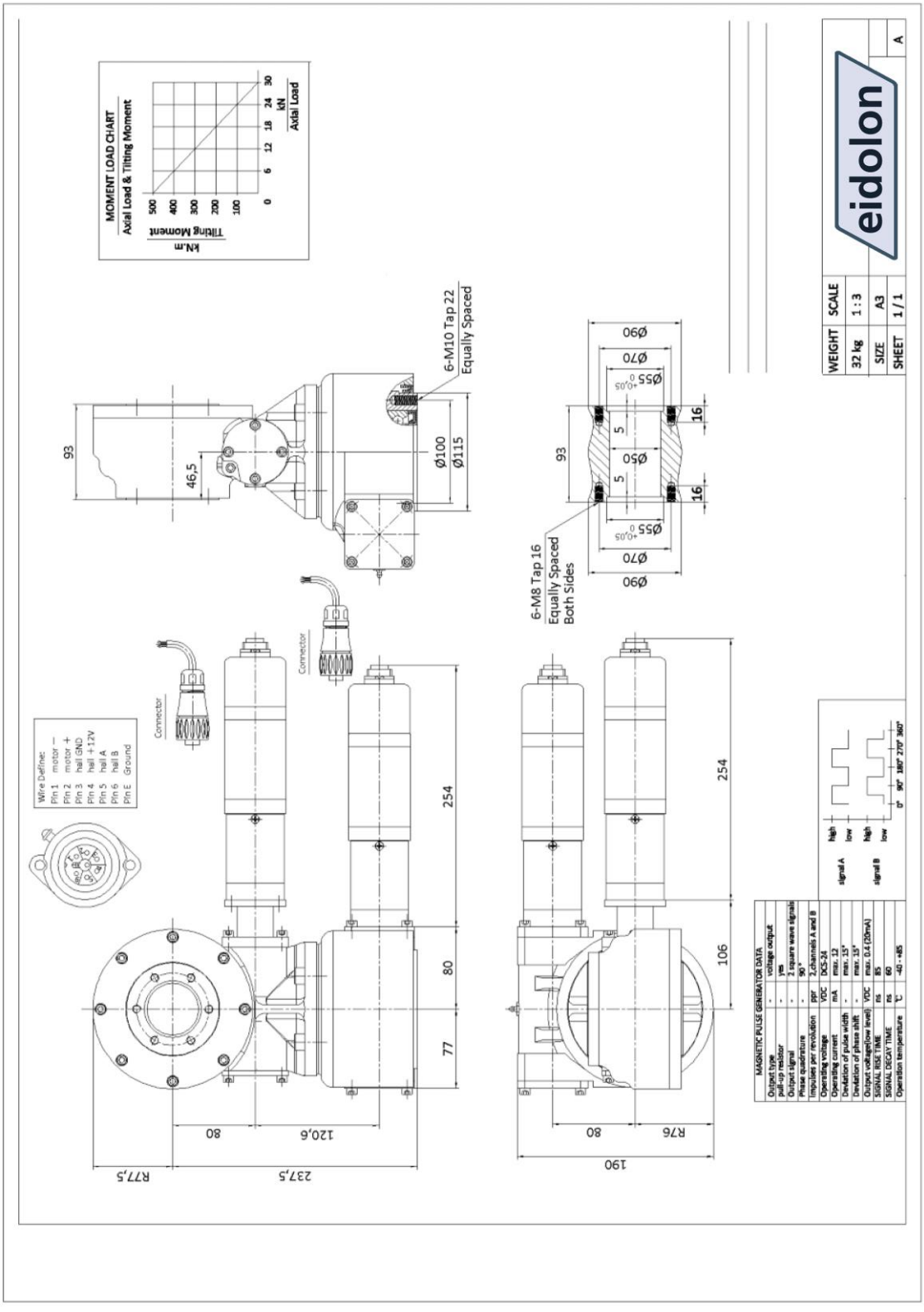


H-bridge BTN7960B


49.657 (mm)
49.403 (mm)
NISI
wingxin
IBT-2
ALFS-TECH.taobao.com
ARDUINO
U2
U3
P3


VCC
GND
U1
U2
U3
P1
P2
P3
BTN7970
SN74AHC244DW
Header 2
Header 4X2

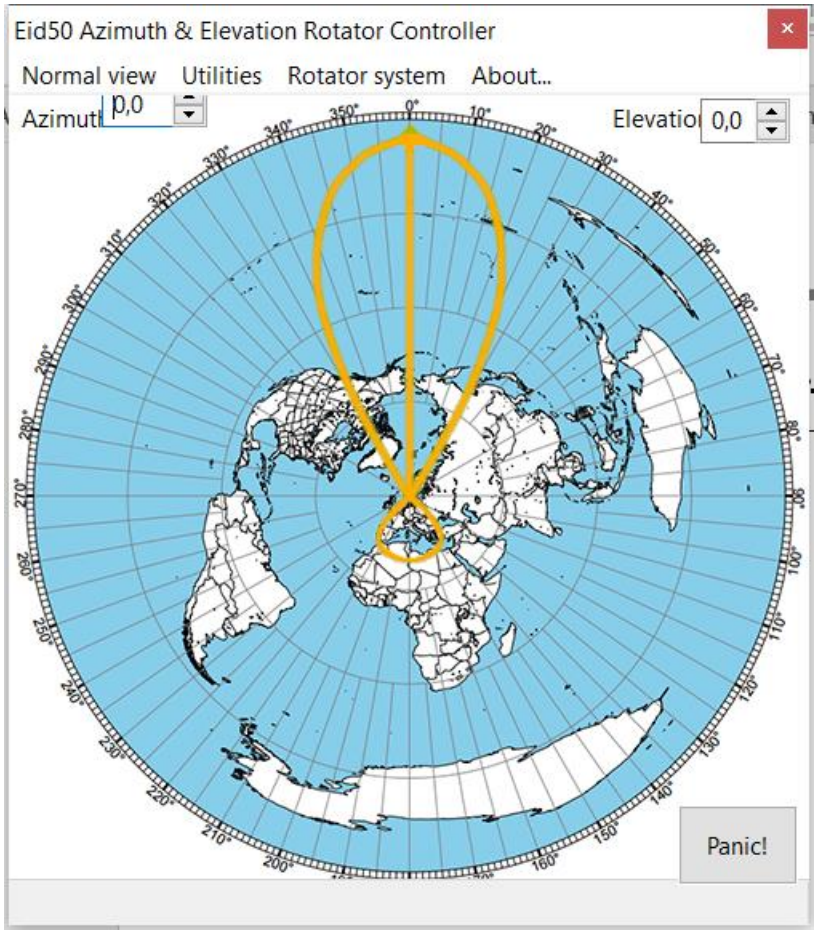
Mechanical drawing



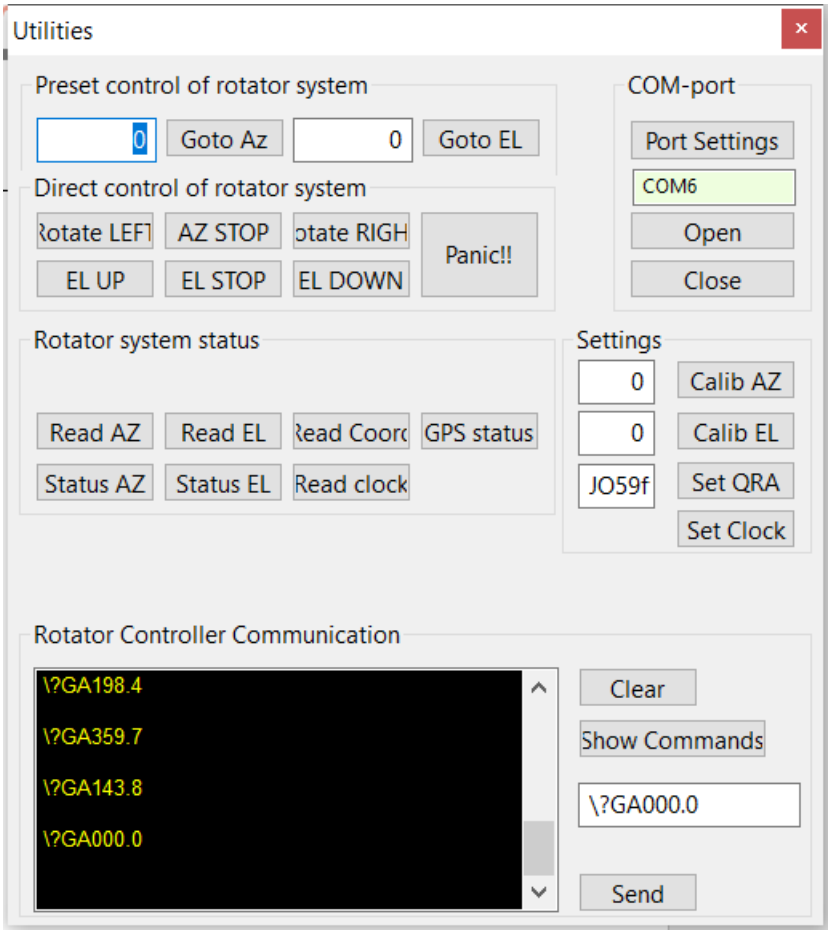
Control Software for Windows

Start the program EIDrotor4RPI.exe

The following screen will apear :



In the menu bar presss Utilities and the following screen will apear:



In Port settings choose the Com port and Open the port.

You will now be able to control the rotor AZ and EL motors.

Eid Rotor leaflet

eidolon Eid Mast & Tower Rotators

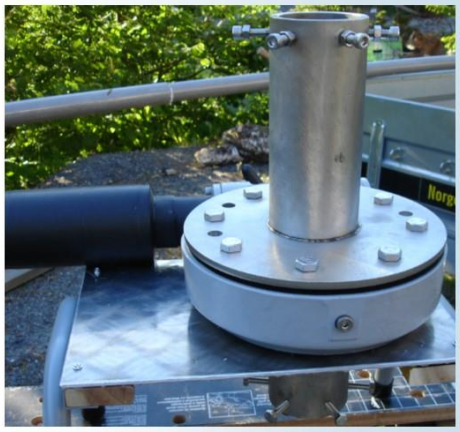
Eidolon is now presenting a new and in many ways a different line of antenna mast and tower rotators.

These drives are modified solar panel rotators which are running almost 24h a day, going back and forth at about 0,048rpm.

Batch of Eid75 the smalest rotor

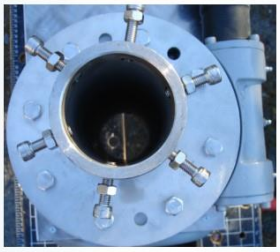
The main goal has been :

- Increased mechanical stability.
- Very high strength.
- Ability to pass the antenna mast through the center of the rotator.
- Placing the Ham Tower on top of the rotator. (large rotator)
- A direction accuracy better than 0,2 degr. is achieved for all units.



Eid175 for installation with upper support bearing and opening for passing a mast through, dia.of 72mm

Stainless steel Rotor Mast Adapteror for Eid75



The heavy duty adapter can adapt a 1,5m² antenna 6,5m above the rotor with a load of 1,36kN/m²

Eid75Az/El.
The smalest AZ/El. Unit

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Eid Mast & Tower Rotators

Eid425

This rotator is strong enough to take a 3 section lattice tower with a 1,5m2

beam on top at 18meters and wind load 1,30 kN/m2

MODELL	Wind area eff. M2	Rotaing torque Nm	Breake torque Nm	Vertical load Kg.	Tilting Moment max Nm	Precision +/-degr.	Rotation time seconds	Mast diameter	Installation on plattform	Weight adapter-1 kg.	Price Euro less VAT	Price USD less tax	Weight rotator kg.	World wide Shipping air
Eid-75	3	400	2000	1600	**500**	<0,2	60	0-65	yes	2	945	1064	15	included
Eid-75 Az/El.	3-6				**500/1100**	<0,2	120	na	yes	na	1648	1855	45	included
														included
Eid-125	6	600	5000	2200	**1800**	<0,2	80	0-65	yes	3	1039	1170	16	included
Eid-175	22	703	10400	5300	**13500**	<0,17	120	0-82	yes	customized	1244	1400	21	included
Eid-175 Az/El.	22	same	same	same	**13500/6000**	<0,17	120	na	yes	customized	2443	2750	60	included
Eid-225	28	805	38700	7100	**33800**	<0,17	120	0-126	yes	customized	1421	1600	53	on request
Eid-300	na	2030	43000	11500	**54300**	<0,17	120	plate	yes	customized	1590	1790	64	on request
Eid-350	na	1122	48000	13300	**67800**	<0,17	120	plate	yes	customized	1696	1909	67	on request
Eid-425	na	1346	72300	23500	**135600**	<0,15	120	plate	yes	customized	2127	2395	108	on request
Eid-525	na	1650	105800	38500	**203000**	<0,15	120	plate	yes	customized	3011	3390	155	on request
Eid-625	na	1980	158300	59000	**271000**	<0,15	120	plate	yes	customized	3793	4270	204	on request

Common for all rotators:			
Installation on flat surface			
Rotation range	Azimut	450 degr. Or as wanted	The E-125 got an opening in the center to let a 51,5mm mast pass through
	Elevation	180 degr.	The E-175 got an opening in the center to let a 97,5mm mast pass through
Magnetic pulse data for direction tracking			
Motor ramp up and ramp down.			
Control cable	2 wires 12 volt+ 2 wires 24 volt and 2 wires data		
Cmmunication	RS232 to PC with USB adapter		
Common control unit for all rotators			
Work with most logging programs			

Rotor adapters are optional and not included in the price.

DATA and pricelist as of June 12th 2016

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