Run "plugins.exe" on Windows 7/10/11. Click the welcome page to enter the goto control panel





Please "Save/Close" to store the settings when leaving the app



Set Time / UTC / Loaction

## Time / UTC (1&2) and

**Location (3)** on plugins must be identical with Windows Stellarium Time is given by Windows automatically.

UTC=Time Zone+DST (Daylight Saving Time)





# **Connect Ez GOTO**

### The settings (com ports) are only demonstrated on our laptop.



## CP2102 (USB adapter) is found at "COM7" automatically.



On Ez Goto menu, input 07(COM7) and set ON The encoders AZ/ALT show up when the com port is connected successfully.



The encoders default Az=45, Alt=45. Push the Dob tube to check the encoders orientation, Dob and encoder plot must move in the same direction.

If not, swap the encoder settings.

The bottom line (Az 3880 Alt 796) means Az encoder is at 3880, and Alt is at 796. The encoder is 12 bits resolution (0~4096 from 0~360 degree)



# **Motors Settings**

CONTROLLER of EZ PUSH TO on STELLARIUM			
PEC ENCODERS	GEARS / MOTORS ABOUT		
	MOTION AZ		
I. EZ GOTO	Motor Type   1.8*		
	Driver Speed		
	Motor Driver		
	Micro Motion		
	Focuser Speed		
	REVERSE		

LER of EZ PUSH TO on STELLARIUM					
ENCODERS	GEARS / MOTORS	ABOUT			
сото	MOTION AZ				
GOIO	Motor Type				
	Driver Speed	Single *			
	Motor Driver	▶ Dual			
	Micro Motion	+			
	Focuser Speed	START	Ali		
		REVERSE	SY		
	Δ7 10	10.0			

Defaults "single", you can learn more on the advanced topic about the dual mode. Dual mode allows goto faster (high speed) and tracking more precise (low speed).

ROLLER of EZ PUSH TO on STELLARIUM				
ENCODERS	GEARS / MOTORS ABOUT			
Z GOTO	MOTION AZ Motor Type	Г		
	Driver Speed			
	Motor Driver   1/32			
	Micro Motion   1/64			
	Focuser Speed + 1/100			
	<b>R</b> 1/128	S		
•	AZ 1.0 1/200 *			
N	1/256			

FROLLER of EZ PUSH TO on STELLARIUM					
ENCODERS	GEARS	/ MOTORS	ABO	UT	
Z GOTO	MOTION AZ Motor Type		×		
	Dri	ver Speed	•		
	Mo	otor Driver		DADAMETEDC	
	Mi	cro Motion	×.	500 HZ	
	Fo	cuser Speed	۰.	250 HZ *	Alig
			🗌 RE	100 HZ	SY:
		AZ 1.0		50 HZ	
		· · - 1···		25 HZ	
				10 HZ	
				10.0	

Micro motion : motors speed options

ER of EZ PUSH TO on STELLARIUM							
NCODERS	GEARS	/ MOTO	DRS	ABO	UT		
M M		A NOITC	Z				
	M	otor Type		•	1		
	Dri	iver Spee	ed	•	Ч		
	M	otor Driv	er	•	DA	DAMETEDS	
	Mi	icro Motion 🔹 🕨				ц I.	
	Fo	cuser Sp	eed	•		500 HZ	
	_			🗆 RE		250 HZ *	S
		AZ	1.0			100 HZ	
			·			50 HZ	
						25 HZ	
		ALT	1.0			10 HZ	
					-0	.000815385	

FocuserSpeed : motor speed options

#### **Motors Learning**





#### See (1)

The main board sends 2048 pulses to measure the angles motors move. The more pulses are learned, the more accurate goto and tracking could be. Note: You can let motors learned **forward and revere** to see if the encoders (page 5) return to original values. Generally, the Dob is supposed to go back to origin perfectly. Otherwise, there must be some parts loose in the installation.

Because of the resolution of the encoder is 0.087 degree, we advice the pulses 8192 at least if your driver is 1/128 or better.

#### See (2)

After measurement, Az motor moves -3.77 degree, Az gear ratio is 9.754, and get -0.00092267 degree/pulse.

Generally, "degree/pulse" must be less than 0.00416 (sidereal tracking rate) to ensure the Dob capable of tracking.

Note: These parameters valid only when the motor type and driver speed mentioned above are given correctly.

### **Control Panel**



Fusion (GOTO/PUSH TO) out of 6 degree

The automatic goto is disabled when checked. You have to push the Dob by hands **The Dob returns to automatic goto when close to the target (< 6 degree)**.

1. Encoder Alignment ( re-alignment )

On windows Stellarium, the first time "ctrl+1" is used to align the encoders Second time "ctrl+1" starts to goto the target. You can **re-align** the encoder anytime by clicking the button.

- Manual Clutch to enable or disable the Stepper Motors
   You need to use clutch prior encoder alignment (offset) or while push to the target. Remember to clutch on when goto and tracking.
- 3. Tracking ON/OFF

Generally, the tracking is imitated automatically after encoder alignment or when the goto is finished.

#### You have to turn on tracking after finishing micro motion.

- 4. Reset / Stop Reset communication and Stop motors
- 5. Micro motion

#### **Connection between Plugins and Windows Stellarium**

Please read the **readme.PDF** to learn more how to create them. Here, we demo the simplest method to create COM5 and COM6.



#### In windows "Device Manager"



# See the clip on youtube(EZ PUSH TO PLUGINS on Stellarium) from 3:58

	Telesc	opes	×
Telescopes	Options	Help	About
Telescopes Co	ntrolled		
#▲ Status	Туре	Name	
1 Stopped	local, Stellar	ium EZ GOTO	
▶ Start	<u>۲</u>		
To slew a conne select that obje that telescope's	cted tele: Add a new ct, then hold down t number. To slew it t	telescope exam the Ctrl key and pr to the center of th	ple, a star), ess the key with e current view, accone's number
	the proof the		a a a a a a a a a a a a a a a a a a a

Configure Telescope X
Telescope controlled by:
• Stellarium, directly through a serial port
<ul> <li>External software or a remote computer</li> </ul>
O RTS2 telescope
<ul> <li>Nothing, just simulate one (a moving reticle)</li> </ul>
Telescope properties
Name:
EZ GOTO
Connection delay: 0.70s 🜲
Coordinate system:
<ul> <li>J2000 (default)</li> <li>Equinox of the date (JNow)</li> </ul>
Start/connect at startup
· · · · · · · · · · · · · · · · · · ·
OK Cancel

Equinox of the Date

Configui	re Telescope	×	
Telescope controlled by:			
• Stellarium, directly through a serial port			
<ul> <li>External software or a remote</li> </ul>	computer		
O RTS2 telescope			
○ INDI/INDIGO			
<ul> <li>Nothing, just simulate one (a r</li> </ul>	noving reticle)		
Device settings		^	
Serial port:	COM6		
Device model:			
Meade LX200 (compatible)	<b>•</b>	E	
Any telescope or telescope mount	compatible with Meade LX200.		
		۰.	
User interface settings			
	Canada		
OK	Cancel		

Device model: Meade LX 200 compatible

	Telesc	opes	×
Telescopes	Options	Help	About
Telescopes Co	ntrolled		
#▲ Status	Туре	Name	
1 Connected	local, Stellari	um EZ GOTO	
Stop			
To slew a conne select that obje that telescope's hold down the A	cted telescope to ar ct, then hold down t number. To slew it t It key and press the	n object (for examp he Ctrl key and pre o the center of the key with that tele	ole, a star), ess the key with e current view, scope's number.



You can see the EZ GOTO bulls-eye appears on the Stellarium skymap when connected correctly.



The send current RA/DEC **flashes** each time to update the position of EZ GOTO bulls-eye once.

#### **First Star Alignment**

See the <u>clip on youtube(EZ PUSH TO PLUGINS on Stellarium)</u> from 5:10

Stellarium 0.15.0					- • •
Vega a Lyr - 3 Lyr - H	IP 91262 - SAO 6	7174 - HD 1	72167 - WDS	a-appornids J18369+384	⊚ 🖸 6AB
<b>G Lyr - 3 Lyr - H.</b> Type: <b>pulsating variable</b> Magnitude: 0.00 (after ext Absolute Magnitude: 0.57 Color Index (B-V): 0.00 Magnitude range: -0.02+0. RA/Dec (on date): 18h37m Hour angle/DE: 23h23m36.7 Az/Alt: +36°40'20.3"/+78°0 Ecliptic longitude/latitude ( Ecliptic longitude/latitude ( Ecliptic longitude/latitude ( Ecliptic longitude/latitude ( Ecliptic obliquity (on date): Galactic longitude/latitude ( Ecliptic obliquity (on date): Galactic longitude/latitude ( Ecliptic obliquity (on date): Bistance: 25.04 ly Spectral Type: A1V Parallax: 0.13023" Arctit Period: 0.19 days Year of last satisfactory ob Position angle: 183.00° Separation: 82.130" (+0°01	IP 91202 - SAU 6 star, double star (DSCTC) inction: 0.13) 07 (Photometric system: V) 56.526/-3894709.0" 42.456/+3894807.7" (apparent) 578.4" (apparent) 12000.0): +285°19'05.6"/+61° on date): +285°39'03.1"/+61° +23°26'11" +67°27'02.0'/+19°14'14.8" 19.25 h1m18.55 urus servation: 2014 '22")	/1/4 - HD 1. 44'05.7" *43'49.8"	Vega	● <b>J18369+384</b>	6AB
Earth, +29°33'29", -	95°31'30"		FOV 98.9° 5	9.4 FPS 2022-08-	01 22:40:31 UTC-

Use mouse to choose the target to align the encoders (offset encoders), eg

"Vega"

Push the Dob to Vega by hands.



Press "ctrl+1" or "ctrl+2" when ready.

You can see the coordinates of Vega (2) sent to plugins (1), and the Dob (EZ GOTO Bulls-eye) matches with Vega in the end (3).

## **Goto and Tracking Adjustment**



After encoder alignment (encoder offset), Use mouse to choose the target to goto

Press "ctrl+1" or "ctrl+2" to "goto target"

You can see the coordinates of the target (2) sent to plugins (1), and the Dob (EZ GOTO Bulls-eye) starts to "goto target" (3).

GEARS / MOTORS ABOUT			
	FOCUSER		
эт	GEAR RAITO	PARAMETERS	
$\mathbf{N}$	PULSES 2048	START	
	E RE	VERSE	
NT R	AZ -2.02	9.118	
20h		-0.00098704	
+4	ALT -1.66	11.037	
		-0.00081538	
NED	TRACKING S	SETTINGS	
= 20	2min 🚽 Side	Real	
c.	AZ: 1.31 Hz		
	ALT: -3.49 Hz	4	

In tracking status, Az and Alt motors must move unevenly to catch up the target. Basically, the motors do the continuous goto all the time. We wish them move smoother when taking pictures. For example, we update the mean tracking speed of the Dob every 2min. There are options of 15s / 30s / 1min / 2min-default / 5min.

You have to set "Solar" speed for Sun, "Lunar" for Moon, and "SideReal" for others

Az 1.31Hz / Alt -3.49Hz indicates the Az motor moves 1.31 step/sec, and Alt moves -3.49 steps/sec. You can adjust them little faster or slower. Remember to "Update" every time after changing settings.