# Gimbal Motor Driver Quick Operation Manual --For GL ||

V1. 0. 0





### **Precautions**

1.Ensure that there are no short circuits in the circuit and that interfaces are connected correctly as required.

2. The driver board will heat up during output; please use it carefully to avoid burns.

3. Before use, please check if all parts are intact. If any parts are missing or aged, please stop using it and contact technical support in time.

4. A Multiple optional control methods cannot be switched while the driver board is running, and the communication protocols between different control methods are different. If you need to switch, please restart the power supply before changing. Using the wrong protocol to control may burn out the driver board!

5. Please strictly follow the working voltage, current, temperature, and other parameters specified in this document; otherwise, it will cause permanent damage to the product!



## 1. Connecting the Motor



S-link USB cable --> PC end

2+2Pin terminal (Power and CAN) --> Motor's 2+2Pin terminal (Power and CAN)

3Pin terminal (UART) --> Motor's 3Pin terminal (UART)

- 1. Connect S-link to the computer and motor.
- 2 Open the upper computer software

Serial Port	Serial port Set param	neters Calibrate Test	Parse				
Serial Port: COM9 🛛 🗸 2							
Baud Rate: 921600 🗸							
Data Bits: 8 🗸							
Parity: None 🗸							
StopBits One ~							
Refresh Open Port 3							
Receiving settings							
ShowText ASCII							
USB模式							
UART							
Firnware upgrade							
ReadVesi							
Firmware REV:							
Bootloader REV:							
OpenFile Upgrade							
Version number							
Progress 0%							
Calibration							
💿 Calibrate							
primary encod							_
Motor mode							
Motor node							ASCII
Save zero Steturn nenu							Send
Version: V1.6.8.5							
Save Data Clear Data EN	ė Obps	۵) ۵%	T 0 bps	(d) 01	% RX: 0	TX:	0 <u>Clear Cou</u>

3、 Click on the "Serial Port" tab; and select the corresponding COM port for S-link.

4、 Click "Open Port".

5 . Turn on the motor power, the motor information will be displayed automatically, and the current control mode will be indicated.



Decog inft:    Decog inft:    Sub Version: 4307    Sub Version: 003    Lax: 10.20194    LU Offset:  2091.9851    LV offset:  2091.9851    Position Sensor Electrical Offset:  -0.6810    Mechanical Offset:  5.997    Output Position:  -2.1274    CAN ID:  0.4001    MASTER ID:  0.4001    MASTER ID:  0.4001    CAN Baud:  1.00Mbps    Motor Info:  Rs = 1807.1753 mQ    Ls = 728.7926 µH  Ψf = 0.0057 Wb    V_BUG=24.1163  Control Mode :    2:position=speed cascade Mode  3:speed Mode     Entering Notor Mode	Debug Tofes			
Sub Version: 003 Imax: 10.201194 I_U Offset: 2059.19851 I_W Offset: 2059.78789 Position Sensor Electrical Offset: -0.6810 Mechanical Offset: 5.9097 Output Position: -2.1274 CAN ID: 0.0001 CAN Baud: 1.00Mbps Motor Info: Rs = 1807.1753 mQ Ls = 728.7920 µH Wf = 0.0057 Wb y_BUB=24.1163 Control Mode : 1:mTT Mode 2:position-speed cascade Mode 3:speed Mode <	framerica Version: 4307			
Imar: 10.201194 IL 0 Offset: 2054.5400 ILV Offset: 2059.8789 Position Sensor Electrical Offset: -0.6810 Mechanical Offset: 5.9097 Output Position: -2.1274 CAN ID: 0.4000 MASTER ID: 0.4000 CAN Baud: 1.00Mbps Motor Info: Rs = 1507.1753 mC Ls = 726.7926 µH wf = 0.0057 wb y_BUS=24.1163 Control Mode : :::::::::::::::::::::::::::::::::::	ub Version: 003			
LU Offset: 2054.5400 LV Offset: 2059.8780 Position Sensor Electrical Offset: -0.6810 Mechanical Offset: 5.9097 Output Position: -2.1274 CAN ID: 0x000 CAN Baud: 1.00Mbps Motor Info: Rs = 1507.1753 mO Ls = 726.7926 µH Ψf = 0.0057 Wb VgBUS=24.1163 Control Mode : :::::::::::::::::::::::::::::::::::	max: 10.261194			
LV Offset: 2001.9851 LW Offset: 2009.8789 Position Sensor Electrical Offset: -0.6810 Mechanical Offset: 5.9097 Output Fosition: -2.1274 CAN ID: 0.0000 CAN Baud: 1.00Mbps Motor Info: Rs = 1507.1753 mG Ls = 708.7926 µH Wf = 0.0057 Wb y_UUS=24.1163 Control Mode : 1.1UTI Mode 2:position-speed cascade Mode 3:speed Mode <	I_U Offset: 2054.5400			
L_W Offset: 2059.8789 Position Sensor Electrical Offset: -0.6810 Machanieal Offset: 5.9097 Output Position: -2.1274 CAN ID: 0.4001 MASTER ID: 0.4000 CAN Baud: 1.00Mbps Motor Info: Rs = 1507.1753 mO Ls = 728.7926 μH Ψf = 0.0057 Wb V_BUS=24.1183 Control Mode : 1:MIT Mode 2:position-speed cascade Mode 3:speed Mode <	I_V Offset: 2091.9851			
Position Sensor Electrical Offset: -0.6810 Mechanical Offset: 5.9097 Output Position: -2.1274 CAN ID: 0x001 MASTER ID: 0x000 CAN Baud: 1.00Mbps Motor Info: Rs = 1807.1753 mQ Ls = 728.7926 µH \Pf = 0.0057 Wb V_BUS=24.1163 Control Mode : 1:MIT Mode 2:position-speed cascade Mode 3:speed Mode <	I_W Offset: 2059.8789			
Mechanical Offset: 5.9097 Output Fosition: -2.1274 CAN ID: 0x000 CAN Baud: 1.00MBps Motor Info: Rs = 1907.1763 mO Ls = 726.7926 µH ψf = 0.0057 Wb y_BUS=24.1163 Control Mode : 1:MIT Mode 2:position-speed cascade Mode 3:speed Mode <	Position Sensor Electrical Offset:	-0.6810		
Output Position: -2.12/4 CAN ID: 0.4001 MASTER ID: 0.4000 CAN Baud: 1.00Mbps Motor Info: Rs = 1807.1753 m0 Ls = 726.7926 µH \UP f = 0.0057 Wb V_BUS=24.1183 Control Mode : 1:MIT Mode 2:position-speed cascade Mode 3:speed Mode <	Mechanical Offset: 5.9097			
CAM 10: 0 000 CAM Baud: 1.00Mbps Motor Info: Rs = 1807.1753 mQ Ls = 726.7926 µH Ψf = 0.0057 Wb V_BUS=24.1163 Control Mode : :INIT Mode 2:position-speed cascade Mode 3:speed Mode < Entering Motor Mode	Output Position: -2.1274			
MASIRAID: 03000 CAN Baud: 1.00Mbps Motor Info: Rs = 1507.1753 mO Ls = 720.7920 µH UF = 0.0057 Wb V_EUS=24.1163 Control Mode : 1:MIT Mode 2:position-speed cascade Mode 3:speed Mode < Entering Motor Mode	CAN ID: UXUUI			
Motor Info: Rs = 1507.1753 mQ Ls = 726.7926 µH \U0374 Vb V_BUS=24.1163 Control Mode : 1:MIT Mode 2:position-speed cascade Mode 3:speed Mode < Entering Motor Mode	CAN Read: 1 00Whra			
Motor Info: Rs = 1507.1753 mO Ls = 726.7926 µH Ψf = 0.0057 Wb V_BUS=24.1183 Control Mode : 1:NUT Mode 2:position=speed cascade Mode 3:speed Mode < Entering Motor Mode	CAN Dadu. 1.00mbps			
Rs = 1507.1753 πΩ Ls = 726.7926 μH Ψf = 0.0057 Ψb V_BUS=24.1163 Control Mode : 1:MUT Mode 2:position-speed cascade Mode 3:speed Mode <	Motor Info:			
Ls = 720,7920 µH \psi = 0.0057 Wb \psissed Node : 1:MIT Node 2:position-speed cascade Node 3:speed Node < Entering Notor Mode	Rs = 1507.1753 mΩ			
Ψf = 0.0057 Wb V_BUS=24.1163 Control Mode : 1:MIT Mode 2:position-speed cascade Mode 3:speed Mode < Entering Motor Mode	Ls = 726.7926 μH			
V_BUS=24.1163 Control Mode : 1:MIT Mode 2:spsed Mode < Entering Motor Mode	Ψf = 0.0057 Wb			
Control Mode : 1:MIT Mode 2:position-speed cascade Mode 3:speed Mode < Entering Motor Mode	_BUS=24.1163			
Control Mode : 1MTT Mode : 2:position-speed cascade Mode 3:speed Mode <				
1:MLI Mode Ziposition-speed cascade Mode 3:speed Mode < Entering Motor Mode	Control Mode :			
Syspeed Mode Control Syspeed Mode	Incle Node			
Entering Motor Mode	(speed Mode <			
Entering Motor Mode	ispecia model (			
	Entering Motor Mode			
ASCII				
				ADCII
57 Sand				<b>Noci</b>

## 2、 Operation

 $\triangle$ : After the motor is reinstalled with the driver board, or if the wiring sequence has been changed, or if the firmware has been updated, calibration must be performed. Refer to Section 4.3 of the "GL40 Module Driver User Manual" for driver board calibration.



## 2.1 MIT Mode

Serial port Set para	meters Calibrate Test	Parse											
Motor Parameters		-Drive parame	ters										
-1 - (-)	Par am Cal cu											Read	Param 2
PhaseRes(R): PhaseInd(L):	1507.175 mR 726.7926 uH	NPP :	14	υ	V:	15	5	Acc:	2				
FluxLinkage(入):	0.005669043 Wb	GR:	1	0	V:	32	2	Dec:	-2	2		Writ	eParam 4
Fri Coeff.:	0.0001607948	CAN ID:	0x01	0	Τ:	10	00	Spee	dLimit: 18	53. 3179			
Inertia:	1.972009E−05 kg*π	Master ID:	0x00	с	AN Timeo	ut: 0		Over	current 0.	8			
Amplitude													
PMAX:	12.5	反馈报文	D[0]		D[1]	D[2]	D[3]		D[4]	D[5]	D[6]	D[7]	
VMAX:	30	MST_ID	ID ERR-	<<4 I	POS[15:8]	POS[7:0]	VEL[11:4]	VEL	[3:0][T[11:8]	T[7:0]	T_MO	S T_Rotor	
TMAX :	10	控制报文	D[0]	D[1]	D[2]	I	D[3]	D[4]	D[5]	D[6	1	D[7]	
KT_OUT:	0	ID	p_des	p_des	v_des	v_d	es[3:0]	Кр	Kd	Kd[3:	0]	t ff17:01	
Gear factor:	1		[15:8]	[7:0]	[11:4]	Kp	[11:8]	[7:0]	[11:4]	t_ff[11	:8]		
Damping factor	4	ID 表示控制命的 ERR 表示故障,5	ID, 取 CAN す应故障类型	_ID 的1tt  为:	8 112	FOS 表示 VEL 表示	电机的速度信	85 息					
		8——超庄 9——欠压	с-	——电机约 ——通讯4	线圈过温	T 表示电 T_MOS 和	机的扭矩信息 表示驱动上 MO	S 的平均	温度,单位で	•			
Control settings	?	в	流; ;过湄 E—	—过载;		T_Rotor 和 位置、速	表示电机内部约 奪和扭矩采用約	的平± 的平±	的温度,单位" 内关系将浮点	℃ 型数据转换	成有符号	号的定点数据。其中	帕
nead	Temphilite				置	采用 16 位委	<b>数据,速度和</b> 扭	矩均使用	月12位。				
ControlMode: 1:MI 1:MI	т <u>~</u> 3					_		↓T_f	f				
CurrentBW: 2:Po 3:Ve	s 1	Pdes	<b>→</b> €		Кр	-		<b>)</b> —	T_re	ef 1	l <b>/кт</b>	iqref	•
Speed KP: 0.61	3		e	) <sub>m</sub>				Î					
Speed KI: 0.00	3					_						1.1.1.1	
Position KP:54		Vdes	<b>→</b> +		Kd						0	Idref	•
Position KI:0			d	θ "									

- 1. Click on the "Set Parameters" tab.
- 2. Click "ReadParam".
- 3. Select "MIT Mode" in the control mode.

4. Click "WriteParam", and after the "Parameter Written Successfully" message pops up, repower the motor.





#### 2.1 Velocity Control



- 1. Click on the "Test" tab.
- 2. Click "MIT" above the control parameters.
- 3. Set the speed to 5rad/s and KD to 0.005N\*s/r.
- 4. Click "Updat".
- 5. Click "Send", and the motor starts to run.
- $\Delta$ : Secure the motor in place.





#### 2.2 Position Control



1. Click on the "Test" tab.



- 2. Click "MIT" above the control parameters.
- 3. Set the position to 12rad, KP to 0.123N/r, and KD to 0.005N\*s/r.
- 4. Click "Updat".
- 5. Click "Send", and the motor starts to run

 $\triangle$ : Pay attention to the initial position of the motor and secure the motor to avoid a large gap from the initial position, causing the motor to impact.





#### 2.3 Torque Control



- 1. Click on the "Test" tab.
- 2. Click "MIT" above the control parameters.
- 3. Set the torque to 0.03N-m.
- 4. Click "Updat".
- 5. Click "Send", and the motor starts to run.

 $\triangle$ : Secure the motor in place. Under no-load conditions, even a small torque will cause the motor to accelerate to the maximum speed rotation.





## 2.2 Position Velocity Mode

otor Parameters		Drive parame	ters								
PhaseRes(R): PhaseInd(L): FluxLinkage(∧): Fri Coeff.: Inertia:	Par anCalou 1507.175 mR 726.7926 uH 0.005669043 Wb 0.0001607948 1.972009E-05 kg*m	NPP: GR: CAN ID: Master ID:	14 1 0x01 0x00	UV: OV: OT: CAN Timeou	15 32 10 at: 0	D	Acc: 2 Dec: -2 SpeedLimit: 15 Overcurrent 0.	3. 3175 3		ReadP WriteF	ar am
plitude											
PMAX:	12.5	反馈报文	D[0]	D[1]	D[2]	D[3]	D[4]	D[5]	D[6]	D[7]	
VMAX:	30	MST_ID	ID ERR<<4	POS[15:8]	POS[7:0]	VEL[11:4]	VEL[3:0][T[11:8]	T[7:0]	T_MOS	T_Rotor	
TMAX:	10	控制报文	D[0]	D[1] [	0[2]	D[3]	D[4] D	[5]	D[6]	D[7]	
KT_OUT:	0	0x100+ID		p_d	es			v_de	\$		
Gear factor: Damping factor ntrol settings Read	1 4 TempWrite ?	ID 表示控制器的 ERR 表示故障, 3 8	ID, 取 CAN_ID 的 时应故障类型为: ; C——电; ;; D——通 ;;过温 E——过;	低 s 位 肌线圈过温 讯丢失; 跋; 置5	POS 表示1 VEL 表示1 T 表示电材 T_MOS 表 T_Rotor 表 位置、速度 采用 16 位数	U机的位置信息 U的扭矩信息 示驱动上 MOS 示电机内部线图 和扭矩采用线 据,速度和扭线	的平均温度,单位"C 囿的平均温度,单位"C 性映射的关系将浮点5 E均使用 12 位。	2 型数据转者	<b>唤成有符号</b> 的	定点数据,其中(	ž
ControlMode 2: Pos 1:MIT CurrentBW: 3: Vel Speed KP: 0.618 Speed KI: 0.003 Position KP: 54	Cal out		Pdes	) F Ə	21	Vdes ң	ΡI dθ <sub>m</sub> O	iqr idre	ef		

- 1. Click on the "Set Parameters" tab.
- 2. Click "ReadParam".



3、Select "Pos";

4. Click "Write Param", and after the "Parameter Written Successfully" message pops up, repower the motor.

	Prompt box	in an	×		
	Parameter writte	en successfully!			
		确定			
Serial port Set parameters Calibrate Test	Parse				
		Position:		rad	CAN ID Master ID: OxOO Read
15 -					Slave ID: Ox01 Set
10					Control Commands
0.					Ente SaveZero Exit
-5 -					CAN baud rate
-10 -					1000 V kbps SET
-15 -					rad/s
		Velocity:		rad/s	MIT Pos Vel Control Parameter
40					Pos 12 rad
20 -					7
0					Vel: 5 rad/s
					MIN MAX
-20 -					-12.5 P 12.5
-40 -					MIN V MAX -30 30
		Torque:		N-m	MIN <b>T</b> MAR
10 -					-10 10
					Speed 47.7465 RPM
5 -					CAN Data 00 00 00 00 00 00 00 00
0					State Motor T Coil T
-5 -					normal operation
-10 -					✓ Time 1 v ms
					gupdat Ulear Send

- 5. Click on the "Test" .
- 6. Click "Pos" above the control parameters.
- 7. Set the position to 12rad and the speed to 5rad/s.
- 8. Click "Updat".
- 9. Click "Send", and the motor starts to run.

#### $\Delta$ : Secure the motor in place.





## 2.3 Velocity Mode

Serial Port	Serial port Set parameters Calibrate Test	Parse
Serial Port: COM37 🗸 🗸	Motor Parameters	Drive parameters
Baud Rate: 921600 $\checkmark$	Parantalau	
Data Bits: 8 🗸	PhaseRes(R): 1507.175 mR	ReadFaran 2
Parity: None 🗸	PhazeInd(L): 726.7926 uH	MPP: 14 UV: 15 Acc: 2
StopBits One ~	FluxLinkage(入): 0.005669043 Wb	GR: 1 OV: 32 Dec: -2 WriteParan
🔿 Refresh 🌋 ClosePort	Fri Coeff.: 0.0001607948	CAN ID: 0x01 0T: 100 SpeedLimit: 153.3178
	Inertia: 1.972009E-05 kg*m	Master ID: 0x00 CAN Timeout: 0 Overcurrent 0.8
ShowText ASCII	Amplitude	
Firmware upgrade	PMAX: 12.5	及環境又 D[0] D[1] D[2] D[3] D[4] D[5] D[6] D[7]
ReadVesion UART	VMAX: 30	warm minus industrial control control control control control control control
Firmware REV:	TMAX: 10	控制报文 D[0] D[1] D[2] D[3]
Bootloader REV:	KT_OUT: 0	0x200+ID v_des
Progress 0%	Gear factor: 1	D 表示控制器的 DL 第 CAN_D 的低 ¥ 位 POS 表示电机的位置 信息 1928 表示规制,对应控制类型为, VL 系示电机的边面信意
		9——欠压, C——电机线圈过温 <sup>1</sup> 乘小电机的回应回应制态 9——欠压, p———通讯手生, T_MOS 表示驱动上 MOS 的平均温度,单位 C
Calibration	Control settings	A — 过电流: D Zanack, T_Rotor表示电机内部线圈的平均温度,单位℃ B — MOS 过援 E — 过载;
© Calibrate primary encod	Read TempWrite	加重、速度和超速来和拉定或用加支效的非外外的非加速效都转变成将付当的点压效率。共计量 重采用 16 位数据,速度和描述的使用 12 位。
Natar nada	ControlMode 3:Vel VI	Vdes 👝 📴 iqref
Motor mode	CurrentBW: 2:Pos 3:Vel	d $\theta_{m}$
	Speed KP: 0.618	
Save zero	Speed KI: 0.003	0 idref
S Return menu	Position KP:54	
	Position KI:0	
Version: V1.6.3.1		
🥌 <u>Save Data</u> <u>Clear Data</u>	± 0 bps (♂) 0%	T 0 bps 3 0% RX: 4323 TX: 0 Clear Count

- 1. Click on the "Set Parameters" tab.
- 2. Click "ReadParam".
- 3、Select "Vel";



4. Click "Write Param", and after the "Parameter Written Successfully" message pops up, repower the motor.



- 5. Click on the "Test" tab.
- 6. Click "Vel" above the control parameters.
- 7. Set the speed to 10rad/s.
- 8. Click "Updat".
- 9. Click "Send", and the motor starts to run.
- $\triangle$ : Secure the motor



