

云际创新-文档中心

为所有人造好无人机 | 无人机软硬件解决方案

# CAN Compass - 电子罗盘模块

# 产品概述

CAN Compass,支持DroneCAN or UAVCAN协议的电子罗盘系统。CAN总线通信方式,传输速率高达 1Mbit/s。工业级地磁传感器RM3100,优秀的抗干扰特性,确保精准的磁航向数据。行业首例运行硬 实时操作系统ThreadX,航空级安全认证。完全适配开源飞控Ardupilot/PX4,接口定义符合Pixhawk硬 件标准。航空CNC外壳材质。





# 产品特性

- CAN通信, DroneCAN/UAVCAN通信协议, 实时性强, 80Hz输出频率;
- 工业级地磁传感器RM3100,优秀的抗干扰特性;
- 硬实时操作系统ThreadX, 航空级安全认证;
- Pixhawk标准硬件接口定义;
- 完全适配开源飞控Ardupilot/PX4;
- 参数配置开关设备终端电阻,适应CAN总线设备挂载方式;

### 规格参数表

处理器	STM32F3 主频72Mhz
传感器	工业级RM3100
实时系统	航空级ThreadX
数据速率	80Hz
通信协议	DroneCAN/UAVCAN
飞控类型	Ardupilot/PX4
接口类型	GHR-04V-S
工作电压	5V
工作温度	-20 to 85°C
尺寸	23.2 <i>28.2</i> 12.5mm
重量	11.7g

### 采购链接

<u>淘宝链接CAN Compass</u>

### 硬件连接

根据接口线序接入到飞控硬件CAN通信接口即可。产品CAN通信接口符合Pixhawk硬件定义标准。



### 指示灯状态

- 常亮状态 一直处于这个状态,表示系统存在异常,无法正常使用;
- 慢速闪烁 没有与飞控CAN通信, 需要配置;
- 快速闪烁 设备正常稳定地输出数据;

#### 使用说明

使用前,需要设置飞控已经打开了CAN总线功能,然后才能正常和CAN Compass完成数据通信。

#### Ardupilot固件

使用Mission planner地面站软件,设置步骤:(配置/调试)->全部参数表。设置以下参数,并在提示成功写入参数后重新启动飞控。

目前飞控一般都是两路CAN总线, CAN1 or CAN2。按照对应标识设置:

CAN\_P1\_DRIVER = 1;

```
CAN_D1_PROTOCOL = 1;
```

or

CAN\_P2\_DRIVER = 1;

CAN\_D2\_PROTOCOL = 1;

正确设置后,查看飞控是否正常识别出CAN Compass。查看步骤:初始设置 -> 必要硬件 -> 指南针。 正常情况下,指南针列表会多出一个UAVCAN类型的设备类型,即表示成功识别,可以后续校准使用 了。如下图:

Co	ompass	s Priorit	y								
Set	the Com	npass Pri	ority by :	reorderir	ng the co	mpasses in the table bel	ow (High	est at t	he top)		
	Priorit	DevID	BusType	Bus	Address	DevType	Missing	Externa	Orientation	Vp	Down
	1	97539	UAVCAN	0	125	SENSOR_ID#1				· 🔶	•
	2	97283	UAVCAN	0	124	SENSOR_ID#1	<b>V</b>				<b>D</b>
	3	658945	12C	0	14	IST8310			None		Ð

温馨提示, CAN Compass方向在外壳有标识。外置罗盘安装时, 与飞控的机头方向选择可以是: 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°。

#### 设备本身参数设置方法

修改设备内部参数,如果CAN罗盘连接在Ardupilot固件定义的CAN1硬件接口,以Mission Planner地 面站为例,飞控连接地面站数据正常后:

页面操作,初始设置->DroneCAN->MAVlink-CAN1。

注意: Mission Planner地面站1.3.8以上版本支持MAVlink-CAN方式。地面站低版本支持SLCAN-USB方式进行连接。查看文档的外设模块->CAN接口模块开启SLCAN功能。

Mp	Mission Plan <mark>per 1.3.80 buil</mark>	<b>d 1.3.84</b> 7	9.2053	9 ArduCopter V4	4.0-dev (ea7c7	dde)					
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<u>, </u>								-		_	-
安	装固件 Legacy	SLCan Di	rect	MAVlink-CAN1	MAVlink-CAM2	Filter	r	After enabling	SLCAN, you wil	l no longer be ab d wait 2 seconds	le to co bafora c
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机	架类型	<u> </u>	'(		ļ			I ver ston [ ver ston	<u>.</u>		
>>	可选硬件										
	RTK/GPS Inject										
	SiK电台(数传)										
	DroneCAN/UAVCAN										
	Invetick										
	PX4F1σ▼光流										
	蓝牙设置										
	Antenna Tracker										

CAN罗盘的Name是org.yji.Compass。

SLC a	n Direct	MAVlink-CAN1	MAVlink-CAN2	Filter	r	After You mu	enabling SLCA st leave this	N, you will no lo: screen and wait	nger be 2 second
	ID	Nume	Mode	Health	Uptime	HW Version	SW Version	SW CRC	Menu
Þ	127	org.missionpla	OPERATIONAL	OK	00:00:06	0.0	1.0.0	0	Menu
	10	?	OPERATIONAL	OK	00:16:08			0	Menu
	125	org.yji.Compas	OPERATIONAL	OK	00:00:31	1.21	1.2.0	0	Menu

右键选择"Menu"按钮,点击"Parameters"查看设备参数。

	SLCan	Direct	MAVlink-CAN1	MAVlink-CA82	Filter	T	After You mu	enabling SLCA st leave this	M, you will no lor screen and wait ?	iger be : Second:	able to connect via MAVLINK. : before connecting again
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CAN罗盘参数有两个:

can\_node\_id: CAN节点ID, 值为0, 表示由飞控自动分配ID。其他值则是设置为一个固定的ID值。 can\_res: CAN终端电阻开关, 值为0, 表示关闭设备的终端电阻, 值为1, 表示打开设备的终端电阻。

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₽	125	org.yji.Compas	OPERATIO	NAL.	OK	00:05:41	1.21	1.2.0		0			Menu
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以修改can\_res值为0为例子,修改值后,点击"写入参数"按钮。完成后,点击"刷新参数",如果值正确即可。

🖳 UAVCAN Params	s - 12	5			 	_		×
命令	<b>△</b>   (j	直	Min	Max	Default	Fav		加载
can_node_id	0		0	127	0			保存
can_res	0		0	1	1			
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## PX4固件

前提条件: PX4固件运行需要飞控确保插入SD卡。

样例说明基于QGC地面站的版本是4.2。

运行QGC地面站,接入飞控通信。点击左上角logo图标,选择进入Vehicle Setup。

N	ot Ready	<b> M</b> anual	<b>"</b>	de al	<b>l</b> Ok					
Fly Plan	1000 m									
( Takeoff										
Return										
								Select Tool	Close	7
								Vehicle Set	up	
								Analyze To	ols	
								Application	n Settings	
								QGroundControl V Development HEAD:f9el -08-31 06:55:11 +0000	/ersion 0c2720 2021	

飞控参数配置检查, UAVCAN\_ENABLE -> Sensors Automatic Config, 设置完参数后重新上电。



PX4固件v1.13.0以上,还需要检查UAVCAN\_SUB\_MAG为Enabled。



PX4固件默认优先使用外部罗盘作为航向解算,到传感器页面进行罗盘校准,校准完确认外置罗盘与飞 控方向即可。

航向查看,按照校准方向,固定好外置罗盘、飞控位置。旋转飞机方向,航向按照正确方向运动即可。



注意:如果只单独旋转外置罗盘,而飞控不是一致的旋转,航向旋转正确,说明外置罗盘正常。 航向数据看得会变得缓慢,这是因为PX4检测到当前外置罗盘与内置方向存在偏差大的情况导致 的现象,不是异常情况。

#### 查看罗盘数据

方法1:进到Analyze Tools -> MAVLink Inspector。默认只有一个外置罗盘的情况下,查看 SCALED\_IM2选项中的, xmag、ymag、zmag数值。

🖾 Back < 🛃 An	alyze	Tools							
E Log Download	Insp	ect real time MAVLink messages.							•*
GeoTag Images	1	ACTUATOR_CONTROL_TARGET	30.8Hz	Message: Component:	SCALED_IMU2 (116) 2 1				
> MAVLink Console	1	ALTITUDE	10.8Hz	Count	547				
	1	ATTITUDE	50.6Hz	Name		Value	Type	Plot 1	Plot 2
MAVLink Inspector	1			xacc		62	int16_t		
	1	ATTITUDE_TARGET	8.0Hz	yacc zacc		-5 -1000	int16_t		
	1	BATTERY_STATUS	0.8Hz	xgyro			int16_t		
		CURRENT EVENT SECULENCE	0.04+	ygyro zgvro			int16_t int16_t	H	
		connent_event_sedoence	0.0112	xmag					
	1			ymag					
	1	EXTENDED_SYS_STATE	2.0Hz	zmag temperature		101 4101	int16_t int16_t	н	
	1	HEARTBEAT	1.0Hz						
	1	HIGHRES_IMU	49.8Hz						
	1	LINK_NODE_STATUS	1.0Hz						
	1								
	1	PING	1.0Hz						
	1								
	1	SCALED_IMU2	25.0Hz						
	1	SCALED_IMU3	25.0Hz						
	1	SERVO_OUTPUT_RAW	20.0Hz						

方法2:进到Analyze Tools -> MAVLink Console。输入uavcan status命令。意思是在CAN1上检测到节点ID为125的罗盘,然后数据在 (instance 1) SCALED\_IMU2里。avg前的数值代表数据刷新的频率。

Back < 🛃 And	alyze Tools
Log Download	Provides a connection to the vehicle's system shell.
GeoTag Images MAVLink Console	TX frames: 39093 CAN2 status: HW errors: 705954 IO errors: 739320 RX frames: 0 TX frames: 5708
MAVLink Inspector	<pre>IX frames: 500 ESC outputs: INFO [mixer_module] Param prefix: UAVCAN_EC control latency: 0 events, Ous elapsed, 0.00us avg, min Ous max Ous 0.000us rms INFO [mixer_module] Mixer loaded: no INFO [mixer_module] Driver instance: 0 Channel Configuration: Channel 1: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 1: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 1: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 1: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 4: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 5: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 6: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 7: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 7: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 7: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 7: value: 0, failsafe: 0, disarmed: 65535, min: 1, max: 0191 Channel 7: value: 0, failsafe: 0, disarmed: 0, 000us avg, min 0us max Ous 0.000us rms INFO [mixer_module] Param prefix: UAVCAN_SV control latency: 0 events, Ous elapsed, 0.00us avg, min 0us max 0us 0.000us rms INFO [mixer_module] Mixer loaded: no INFO [mixer_module] Driver instance: 0 Channel 0: value: 0, failsafe: 0, disarmed: 0, min: 0, max: 0 Channel 1: value: 0, failsafe: 0, disarmed: 0, min: 0, max: 0 Channel 1: value: 0, failsafe: 0, disarmed: 0, min: 0, max: 0 Channel 1: value: 0, failsafe: 0, disarmed: 0, min: 0, max: 0 Channel 5: value: 0, failsafe: 0, disarmed: 0, min: 0, max: 0 Channel 5: value: 0, failsafe: 0, disarmed: 0, min: 0, max: 0 Channel 7: value: 0, failsafe: 0, disarmed: 0, min: 0, max: 0 Channel 7: value: 0, failsafe: 0, disarmed: 0, min: 0, max: 0 Channel 7: value: 0, failsafe: 0, disarmed: 0, min: 0, max: 0</pre>
	Sensor 'mag': name: uavcan mag channel 0: node id 125> instance 1 Online nodes (Node ID, Health, Mode): 125 OK opERAT warran: curls time: 612651 events, 55291904us slapsed, 90 24us avc. min 13us may 49815us 208 533us res
	uavoan: cycle cime: ciresi events, 55251904us elapsed, 50.24us avg, min 13us max 45013us 208.5334s rms uavoan: cycle interval: 612651 events, 2281.12us avg, min 24us max 49825us 1095.930us rms nsh>

#### 设备本身参数设置方法

进到Vehicle Setup -> Parameters选项,参数拉到最后,可以看到CAN设备,例如样例中是 Component 125 (分配125节点),点击展开可以看到设备参数,点击即可进行参数修改。



CAN罗盘参数有两个:

can\_node\_id: CAN节点ID, 值为0, 表示由飞控自动分配ID。其他值则是设置为一个固定的ID值。 can\_res: CAN终端电阻开关, 值为0, 表示关闭设备的终端电阻, 值为1, 表示打开设备的终端电阻。

注意:目前PX4固件对于所有CAN外设,只有CAN1口才能修改设备本身参数,接入到CAN2口的无法设置。