ROBOTICS

SKYMATE™

COMMERCIAL FLIGHT CONTROLLER

FEATURES & SPECIFICATIONS MANUAL

SKYMATE
COMMERCIAL FLIGHT CONTROLLER

IS BUILT TO SUPPORT THE UAS/RPAS INDUSTRY RELIABILITY AND PERFORMANCE NEEDS. ITS FAMILY OF ACCESSORIES OFFERS YOUR AIRCRAFT WITH THE BEST FLIGHT AUTOMATION IN THE MARKET.

SKYMATE Technology is integrated into aircraft across the world since 2015. It cumulates thousands of flight hours in all types of weather

Suggested UAS Applications Aerial Surveys & Inspection | Agriculture Monitoring & Spraying | Security & Defense | Delivery

Optimized for:

- Configurations Supported: Multirotor or Custom*
- Multiple Configurable Flight Modes
- Tuning based on Motor Characteristic & Inertia Gains Methods
- Factory Calibrated (IMUs & Magnetometer)
- Aircraft Weight & Size Agnostic
- IMU, Magnetometer, GNSS, Power & CAN Bus Redundancy
- In-flight Centimetric Precision with RTK Compatible Antennas Kit
- Resistant to Magnetic perturbation with GNSS Heading Antennas Kit
- Ethernet Connection Compatibility
- Long Range Radio (up to 3 km)**
- Control & Log Information from the Aircraft Payloads
- Support Gremsy Gimbal Control & Intelligent Landing Gear
- Cold Weather Resistant
- Aerospace Grade Connectors (Up to 20G resistant)
- Compatible with SkyControl Software License (Advanced configuration, Mission planning, Post-flight data monitoring and analyzing)

* With firmware custom development & maintenance plan
** Demonstrated inflight with line of sight conditions and ideal antennas orientations

SKYMATE SERIES

CUSTOMIZE HARDWARE SELECTION ACCORDING TO YOUR AIRCRAFT APPLICATIONS

COMBINE THE SKYMATE AUTOPILOT WITH DEDICATED HARDWARE ACCESSORIES TO ENABLE ADVANCED FEATURES.

SKYMATE Autopilot

Power Module

Any SKYMATE kit requires at least one Power Module to supply power to your SKYMATE accessories.

- Current Max: 55 A
- Dimensions: 105 mm x 122 mm x 18 mm
- For Large Aircraft

6-22S

- Current Max: 55 A
- Dimensions: 95 mm x 69 mm x 21 mm
- For Smaller Aircraft

6-22S Lite

GNSS / Compass Antennas

GNSS / Compass Antennas enable SKYMATE position assistance and autonomous flight modes.

- Navigation Accuracy: 2.5m CEP (50%)
- Dimensions: 58 mm x 58 mm x 11 mm

GNSS
24 hours in static condition with more then 6 satellites in view

- Navigation Accuracy: 0.025m + 1ppm CEP (50%)
- Dimensions : 100 mm x 100 mm x 13 mm

RTK
24 hours in static condition with more then 6 satellites in view (Up to 10km distance between base station and receiver)

- Navigation Accuracy: 0.025m + 1ppm CEP (50%)
- Dimensions : 100 mm x 100 mm x 13 mm
- Enables GNSS Heading

RTK MBS
24 hours in static condition with more than 6 satellites in view (Up to 10km distance between base station and receiver)

Data Link Kit

The Data Links provide real time telemetry through SkyControl Software.
This device is strongly recommended and mandatory for autonomous modes.

- Range 1 km Line of Sight

Data Link 900 MHz

- Range 3 km Line of Sight

Long Range 2.4 GHz

- Range 3 km Line of Sight
- Enables RTK centimetric in flight precision

Long Range 2.4 GHz RTK Base Station

Peripherals

Convenient for easy integration.

Breakout Board

HUB 4 Ports

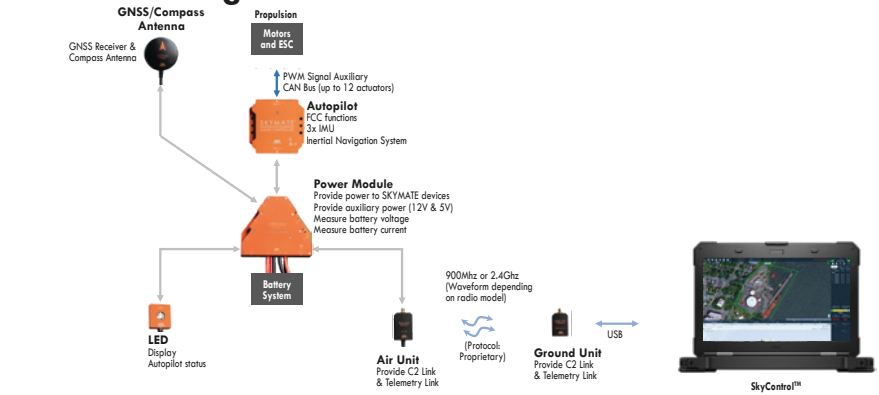
HUB 6 Ports

LED

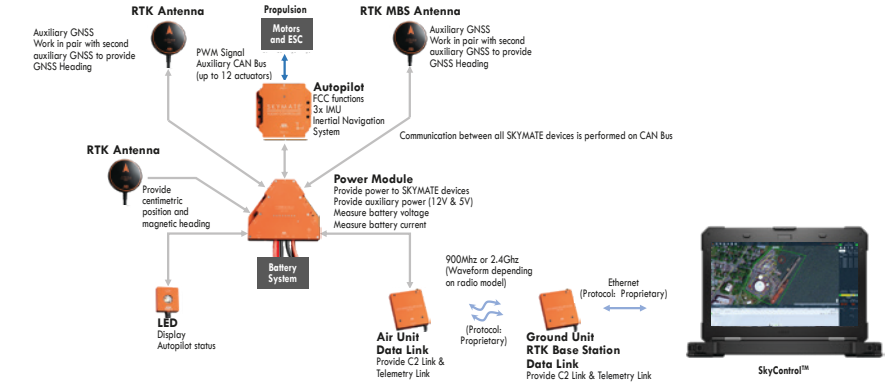
SKYMATE
COMMERCIAL FLIGHT CONTROLLER

TYPICAL CONFIGURATIONS

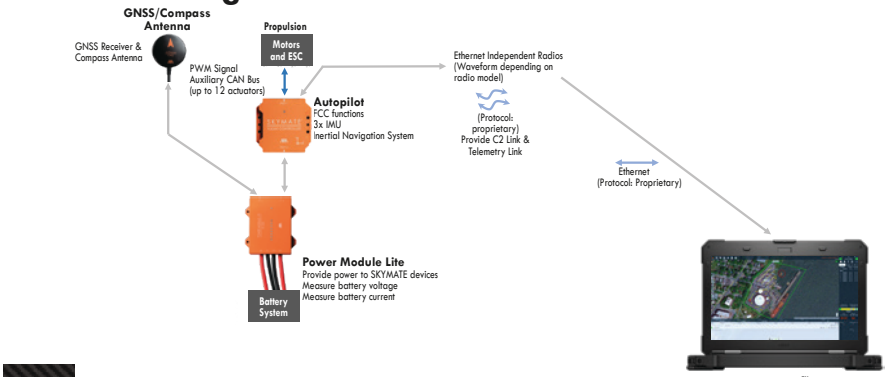
Standard Configuration



RTK and GNSS Heading with Long Range Data Link Configuration



Minimal Configuration



AUTOPILOT

SKYMATE AUTOPILOT CONTROLS AND NAVIGATES AIRCRAFT AUTONOMOUSLY

IT CONNECTS TO ALL SKYMATE HARDWARE AND ACTS AS THE FLIGHT MANAGEMENT SYSTEM TO ENSURE FLIGHT SAFETY AND PERFORMANCE

SKYMATE V3.0

Features & Specifications	
Proprietary Firmware	X
Supported Flight Modes All flight Modes are Configurable	Mission (Pre-programmed Waypoints via SkyControl) Position Assisted (X/Y/Z Velocity Control) * Stabilized (Roll/Pitch/Yaw/Altitude Control with Automatic Position Hold) * Manual (Roll/Pitch/Yaw/Throttle Control) Return to Launch (Emergency landing on Pre-defined Launch Point Recovery Landing (Emergency Landing at the UAS Location)
Number of Motors Supported	4 to 12
Supported Configuration	Quadcopter: 4+ 4X | Hexcopter 6+ 6X | Octocopter 8+ 8X | Coax 8X
Permanent Factory Calibration	Scale-Factor, Triad Mis-alignment and Bias Magnetometer & IMUs
Embedded Reference Models	World Magnetic & World Gravitational
Redundancy Capability	3 x IMUs (SKYMATE Default) | Up to 3 GNSS / Compass Antennas | Up to 2 Power Modules Dual CAN Bus (all devices)
Flight Mode RGB LED	X
I/O Intelligent Ports	Ethernet USB NMEA + PPS for LiDAR Synchronization Payload Trigger & Record Gimbal Control (Gremsy Only) Intelligent Landing Gear Smart Port Telemetry (FrSKy Compatible)
Remote Controller Supported Protocols	S.Bus / Via Ethernet
Maximum Number of Waypoints	Up to 60**
Flight Log (Black box)	Up to 8 Hours of Flight Time
Update & Data Logging Rate	400 Hz
Configurable Fail-safes	Geofences (Altitude/Radius/Custom Shapes Based on LLA Coordinates) Battery Voltage Stages RC Link Loss Stages Data Link Loss Stages Dual Link Loss
Roll/Pitch/Yaw Precision (Hovering)	0.5 °
Mounting Holes	X
Dimensions	66.44 mm x 63.40 mm x 14 mm
Operating Temperature	-40/+50 °C
Storage Temperature	5/30 °C
Weight	66 g
CAN Bus Connectors	Harwin M80-9411242

* User can configure either Stabilized or Position Assisted

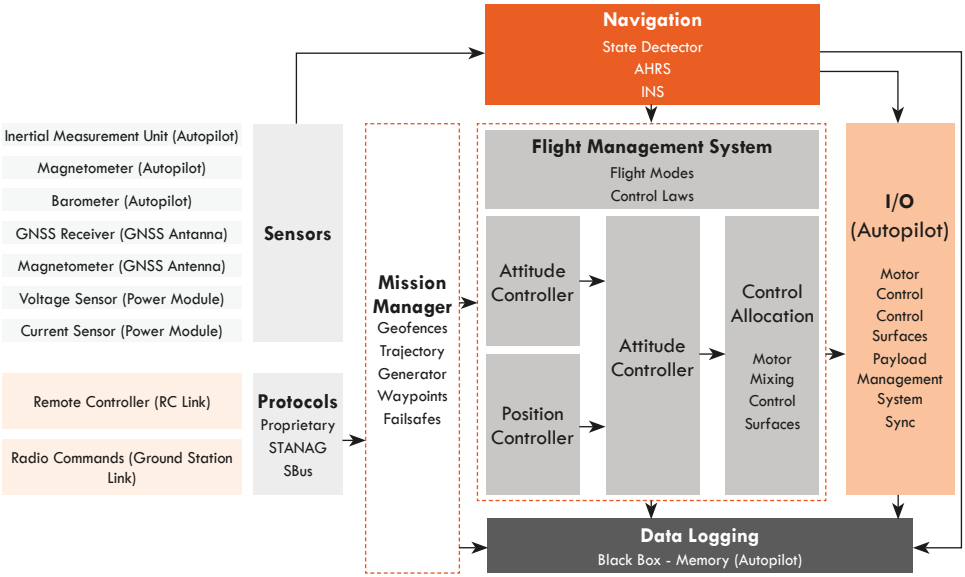
** Waypoints include (H.Speed /V.Speed/Altitude/Turn mode/Delay/Up to 16 actions each/Orientation mode)

AUTOPILOT

A COMPLETE SOFTWARE ARCHITECTURE TO ENSURE FLIGHT SAFETY AND PERFORMANCE

SKYMATE FLIGHT CONTROLLER OFFERS A COMPLETE EMBEDDED FIRMWARE ENVIRONMENT TO SUPPORT AUTOMATION AND FAILSAFE IN CASE OF A CRITICAL SYSTEM FAILURE.

High-Level Software Architecture Diagram



Ports

Port 1 (IOs to Motor, RC-S.BUS & Payload):

Pin Wing	Function	Pin	Function	Pin	Function
1	12 V	13	12 V	25	12 V
2	CAN A High	14	RX-	26	TX-
3	CAN A Low	15	RX+	27	TX+
4	GTX	16	5V RC	28	NMEA
5	M4	17	M8	29	IO4
6	M3	18	M7	30	IO3
7	M2	19	M6	31	IO2
8	M1	20	M5	32	IO1
9	GRX	21	5V ESC	33	USB1 D+
10	CAN B High	22	PPS	34	USB1 D-
11	CAN B Low	23	RC	35	USB1 SV
12	GND	24	GND	36	GND
Wing					

Port 2 (CAN-Bus):

			Notch			
Pin	6	5	4	3	2	1
Signal	USB2 D+	CAN B Low	CAN A Low	GND	GND	12 V
Signal	USB2 D-	USB 5 V	CAN B High	CAN A High	GND	12 V
Pin	12	11	10	9	8	7

POWER MODULES

THE POWER MODULES PROVIDE VOLTAGE AND CURRENT MONITORING

THIS DEVICE IS REQUIRED WITH ANY SKYMATE AUTOPILOT USAGE TO PROVIDE ADEQUATE POWER AS WELL AS CAN BUS PORTS CONNECTIONS.

Power Module 6-22S

Power Module 6-22S Lite

Features & Specifications		
	Power Module 6-22S	Power Module 6-22S Lite
25 V to 90 V Input/ Output 19.8 V to 92.4 V	X	X
55 A Continuous Current Output	X	X
110 A Peak Current Output	X	X
Supply Voltage: 12 V @ 5 A	12 V	12 V
Supply Maximum Current: 5 V @ 2 A	Ports 2-7: 1A / Ports 8-9: 5 A	4.5 A
USB Connection through Ports	X – EXCEPT Port 1	N/A
Power Redundancy *	X	N/A
Dimensions	105 mm x 122 mm x 18 mm	95 mm x 69 mm x 21 mm
Max Operating Temperature	-40/+40 °C	-40/+40 °C
Storage Temperature	5/30 °C	5/30 °C
Weight	312 g	225 g
CAN Bus Connectors	Harwin M80-9411242	Harwin M80-9411242
Power Connectors	Amass XT150-F&M	Amass XT150-F&M
CAN Bus Redundancy	X	X

* When combined with an additional unit in parallel

WARNING: Do not use port 1 for USB Connection

GNSS / COMPASS ANTENNAS

THE GNSS / COMPASS SERIES OF ANTENNAS PROVIDE HIGH ACCURACY IN-FLIGHT POSITIONING AND ORIENTATION ESTIMATION ENABLING FLIGHT ASSISTANCE AND AUTOMATION

COMBINING MULTIPLE ANTENNAS WILL ENABLE GNSS & COMPASS REDUNDANCY

GNSS Antenna

RTK Antenna

RTK MBS Antenna

Features & Specifications			
	GNSS / Compass	**GNSS / Compass / RTK**	**GNSS / Compass / RTK MBS**
Typical In-flight Position Accuracy	All axes : 1.5 m (RMS)	All axes : 2 cm (RMS)	All axes : 2 cm (RMS)
Accuracy	Horizontal : 2.5 m CEP (50%) Vertical : 3.0 m CEP (50%) 24 hours in static condition with more then 6 satellites in view	All axes : 0.025 m + 1ppm CEP (50%) 24 hours in static condition with more then 6 satellites in view (Up to 10 km distance between base station and receiver)	All axes : 0.025 m + 1ppm CEP (50%) 24 hours in static condition with more then 6 satellites in view (Up to 10 km distance between base station and receiver)
Redundancy Capability	X	X	X
Frequency	GP1 L1C/A, SBAS L1C/A, QZSS L1C/A, QZSS L1 SAIF, GLONASS L1OF, BeiDou B11, Galileo E1 B/C		
GNSS Heading Estimation	N/A	Combined with RTK MBS Antenna	Combined with Standard RTK Antenna
CAN Bus Connectors	Harwin M80-9411242	Harwin M80-9411242	Harwin M80-9411242
CAN Bus Redundancy	X	X	X
Dimensions	58 mm x 58 mm x 11 mm	100 mm x 100 mm x 13 mm	100 mm x 100 mm x 13 mm
Operating Temperature	-40/+50 °C	-40/+50 °C	-40/+50 °C
Storage Temperature	5/30 °C	5/30 °C	5/30 °C
Weight	75 g	97 g	97 g

DATA LINKS

THE DATA LINK PROVIDES REAL TIME TELEMETRY AND COMMAND & CONTROL FEATURES

COMBINING MULTIPLE ANTENNAS WILL ENABLE GNSS & COMPASS REDUNDANCY

Long Range Data Link 2.4 GHz

- Air Unit
- Ground Unit
- Ground RTK Base Station Unit

Data Link 900 MHz

- Air Unit
- Ground Unit

Features & Specifications		
	Long Range Data Link 2.4 GHz	**Data Link 900 MHz**
Maximum Range LOS	3 km	1 km
Auto-Connect Feature	X	X
Security	X	X
RTK Base Station Capability	X*	N/A
CAN Bus Connectors	Harwin M80-9411242	Harwin M80-9411242
RF Connectors	SMA	N/A
S.Bus Bridge Capability	X	N/A
Dimensions	Air Unit: 88 mm x 78 mm x 21 mm Ground Unit: 134 mm x 95 mm x 30 mm Ground Unit RTM BS: 142 mm x 95 mm x 30 mm	Air Unit: 52 mm x 34 mm x 17 mm Ground Unit: 43 mm x 29 mm x 13 mm
Max Operating Temperature	-40/+50 °C	-40/+50 °C
Storage Temperature	5/30 °C	5/30 °C
Weight	Air Unit: 234 g Ground Unit: 336 g	Air Unit: 17.54 g Ground Unit: 46 g
Radio Spectrum	2400 - 2482 MHz	902 - 928 MHz

* When purchasing RTK Base Station version

PERIPHERALS
ADDITIONAL COMPONENTS FOR SKYMATE INTEGRATION

SKYMATE PERIPHERALS ARE OPTIONAL DEVICES THAT CAN OFFER ADDITIONAL FLEXIBILITY TO FIT YOUR AIRCRAFT PARTICULARITIES

Breakout Board

HUB 4 Ports

HUB 6 Ports

LED

Features & Specifications			
	Breakout Board	**Hubs 4-6 Ports**	**LED**
IO Configuration	See Image Below		
RJ45 Ethernet Connection	X		
Number of CAN Bus Ports	0	4 / 6	
Flight Mode Status RGB LED			X
CAN Bus Connectors	N/A	Harwin M80-9411242	Harwin M80-9411242
Dimensions	30 mm x 96 mm x 21 mm	4 Ports : 19 mm x 82 mm x 14 mm 6 Ports: 19 mm x 118 mm x 14 mm	34 mm x 30 mm x 15 mm
Max Operating Temperature	-40/+50 °C	-40/+50 °C	-40/+50 °C
Storage Temperature	5/30 °C	5/30 °C	5/30 °C
Weight	33 g	4 Ports : 48 g 6 Ports : 61 g	40 g

Breakout Board IO Configuration:

3	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**	**33**	**36**	**39**	**42**
RC	NMEA	M12	M11	M10	M9	M8	M7	M6	M5	M4	M3	M2	M1
2	**5**	**8**	**11**	**14**	**17**	**20**	**23**	**26**	**29**	**32**	**35**	**38**	**41**
5V RC	PPS	5V ESC	5V ESC	5V ESC	5V ESC	5V ESC	5V ESC	5V ESC	5V ESC	5V ESC	5V ESC	5V ESC	5V ESC
1	**4**	**7**	**10**	**13**	**16**	**19**	**22**	**25**	**28**	**31**	**34**	**37**	**40**
GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND
PCB													

SKYMATE CABLES

ADDITIONAL CABLES FOR SKYMATE INTEGRATION

SKYMATE CABLES ARE OPTIONAL AND OFFER ADDITIONAL FLEXIBILITY TO FIT YOUR AIRCRAFT PARTICULARITIES

USB Cable

CAN Bus Port to a Personal Computer

Features & Specifications	
USB Cable	
Length	**1800 mm**
Connectors	Micro USB B & Harwin M80-9411242

			Notch			
Pin	**6**	**5**	**4**	**3**	**2**	**1**
Signal	USB D+					
Signal	USB D -	USB 5 V			GND	
Pin	**12**	**11**	**10**	**9**	**8**	**7**

Breakout Board Cable

Autopilot to the Breakout Board

Features & Specifications	
USB Cable	
Length	**230 mm**
Connectors	Harwin M83-LM-L3M7N36-0000-000

Pin / Wing	Function	Pin	Function	Pin	Function
1	12 V	**13**	12 V	**25**	12 V
2	CAN A High	**14**	RX-	**26**	TX-
3	CAN A Low	**15**	RX+	**27**	TX+
4	GTX	**16**	5V RC	**28**	NMEA
5	M4	**17**	M8	**29**	IO4
6	M3	**18**	M7	**30**	IO3
7	M2	**19**	M6	**31**	IO2
8	M1	**20**	M5	**32**	IO1
9	GRX	**21**	5V ESC	**33**	USB1 D+
10	CAN B High	**22**	PPS	**34**	USB1 D-
11	CAN B Low	**23**	RC	**35**	USB1 SV
12	GND	**24**	GND	**36**	GND
Wing					

Power Module Cable

Power Module to Autopilot

Features & Specifications	
USB Cable	
Length	**100 mm**
Connectors	Harwin M80-9411242 x 2

			Notch			
Pin	**6**	**5**	**4**	**3**	**2**	**1**
Signal	USB D+	CAN B Low	CAN A Low	GND	GND	12 V
Signal	USB D -	USB 5 V	CAN B High	CAN A High	GND	12 V
Pin	**12**	**11**	**10**	**9**	**8**	**7**

OEM Version & volume orders

The majority of SKYMATE hardware components can be ordered without aluminum enclosure to facilitate its integration into your UAS/RPAS.

ARA Robotics offers a discount on volume orders. Contact us at sales@ara-uas.com to discuss with a sales representative and learn more about our volume purchase plans.

Support, Terms & Conditions

SKYMATE Flight Controller product family gives you access to ARA Robotics line of support. Our expert will be glad to assist you with the integration of your product into your aircraft. Basic methods of integration (installation and tuning) are presented into our user manuals and online tutorial videos

SKYMATE firmware is being continuously improve including the addition of new features each 2-3 months. The upgrades are free and will be accessible through SkyControl Software Interface.

Support: support@ara-uas.com

Tutorials video: https://youtube.com/channel/UCJftWJUMxHW2SqjRRBj3TBw

User Manual: https://ararobotique.atlassian.net/wiki/

SKYMATE products are subject to ARA Robotics terms and conditions.
More information on the T&C and product guarantees can be found here:
https://ara-uas.com/terms-conditions

Dedicated Control Laws, Sensor Integration, Code Maintenance & Certifications

Your project requires advance expertise and you would like us to assist you? We offer customized consulting services allowing our clients to receive assistance through tuning, flight performance validation, aircraft certifications and sensor integration phases. Our SKYMATE environment allows us to support different firmware version for our customers including different feature sets as well as control laws based on their aircraft characteristics. Contact a sales representative today to obtain more information on these services: sales@ara-uas.com

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