# **MC01 Software Manual**

Release 6.12

Embention

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In this manual the user can consult a brief description of all the applications created and designed to work together with the **Veronte MC01**.

In addition, links are available to access the manuals for each of these applications.

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	Veronte Link interconnects multiple control sta	tions and autopilot units, so they can operate simultaneously.

#### CHAPTER

#### SOFTWARE APPLICATIONS

For configuring MC01, Veronte Link is required to connect an Autopilot 1x to the computer. This autopilot must be configured to operate as a CAN-USB (or CAN-RS) converter in 1x PDI Builder for then, configuring MC01 through its corresponding PDI Builder.

#### 1.1 Veronte Link

**Veronte Link** establishes communication between a computer and any Veronte product by creating a VCP bridge. It allows to use multiple control stations and autopilots to be interconnected, operating simultaneously. **Veronte Link** also includes a post-flight viewer, to reproduce all recorded data from previous flights and generate plots and reports.

For more information, visit the Veronte Link user manual.

### 1.2 1x PDI Builder

**1x PDI Builder** is the main configuration tool to adapt a **Veronte Autopilot 1x** to a specific application, including user-defined communication protocols. **1x PDI Builder** includes:

- Telemetry: real-time onboard UAV metrics, such as sensors, actuators and control states.
- Configuration: edit vehicle settings, such as servo trim, interface/port management and modes.
- Automations: actions that are automatically executed when a set of configured conditions are accomplished.
- Block Programs: Veronte Autopilot 1x can be programmed with a friendly-user programming language.

For more information, visit the 1x PDI Builder user manual.

#### 1.3 MC01S PDI Builder

**MC01S PDI Builder** configures the stepper variant of **MC01** (MC01S). This application allows to adapt control, communications and telemetry to each motor implementation.

To know more, read the MC01S PDI Builder user manual.

## 1.4 MC01B PDI Builder

**MC01B PDI Builder** configures the brushless variant of **MC01** (MC01B). This application allows to adapt control, communications and telemetry to each motor implementation.

To use it, consult the MC01B PDI Builder user manual.

#### CHAPTER

#### TWO

## LISTS OF VARIABLES

This section shows the variables employed exclusively by **Veronte MC01**. The rest of variables can be read in the Lists of variables section of **1x Software Manual**.

## 2.1 BIT Variables

ID	Name	Description
400	C1 Low Frequency	<ul> <li>Low priority task frequency - Dependent on <i>CIO Running</i> <i>Frequency (RVar 2057)</i></li> <li>• 0 for error → <i>CIO Running</i> <i>Frequency</i> &lt; 10 Hz</li> <li>• 1 for OK → <i>CIO Running</i> <i>Frequency</i> &gt; 10 Hz</li> </ul>
402	Acquisition step missed	<ul> <li>0 for Acquisition step missed → High priority task frequency fluctuation is higher than permitted (1%).</li> <li>1 for Acquisition Task OK → High priority task frequency fluctuation is under set limits (1%).</li> </ul>
480	MC01 Stepper direction output	0 for error, 1 for OK
481	MC01 Brushless driver fault	0 for error, 1 for OK
484	MC General health error	0 for health error, 1 for status OK

## 2.2 Real Variables (RVar) - 32 Bits

ID	Name	Units/Values	Description
2057	CIO Running Frequency	Hz	Low priority task running frequency
2058	CIO Min Running Frequency	Hz	Minimum assured frequency of low priority
2330	Control Loop Period	S	MC control loop period
2331	Control Loop Maximum Period	S	MC maximum control loop period

continues or

2346 MC Speed Controller Output - MC speed PDI output	ID	Name	Units/Values	Description
2333       MC control Loop Maximum Duration       s       MC control loop maximum execution time         2334       Control Loop CPU Usage Ratio       %       MC CPU usage ratio         2335       MC Control Loop Maximum CPU Usage Ratio       %       MC maximum CPU usage ratio         2336       MC U Phase Current       -       Output current through phase U         2337       MC V Phase Current       -       Output current through phase V         2338       MC Electrical Angle       rad       MCOI mechanical angle         2340       MCOI Mechanical Angle       rad       MCOI mechanical angle         2341       MC Desired Mechanical Angle       rad/s       MCOI desired mechanical angle         2342       MCOI Desired Mechanical Angular Speed       rad/s       MC desired mechanical angular speed after s         2344       MC Desired Mechanical Angular Speed After Speed Limiter       rad/s       MC desired mechanical angular speed after s         2345       MC Desired Mechanical Angular Speed After Speed Limiter       -       MC alpha current after Clarke transformation         2346       MC Speed Controller Output       -       MC alpha current after Clarke transformation         2347       MC Alpha Current       -       MC actual Quadrature current         2348       MC Beta current after Clarke	2332	Control Loop Duration	s	
2334       Control Loop CPU Usage Ratio       %       MC CPU usage ratio         2335       MC Control Loop Maximum CPU Usage Ratio       %       MC maximum CPU usage ratio         2336       MC V Phase Current       -       Output current through phase U         2337       MC V Phase Current       -       Output current through phase V         2338       MC W Phase Current       -       Output current through phase V         2339       MC Electrical Angle       rad       MC electrical angle         2340       MCOI Desired Mechanical Angle       rad/s       MCOI desired mechanical angle         2341       MCOI Desired Mechanical Angle       rad/s       MCOI position Controller Output         2344       MCOI Desired Mechanical Angluar Speed       rad/s       MC desired mechanical angluar speed         2344       MCO Desired Mechanical Angluar Speed After Speed Limiter       rad/s       MC desired mechanical angluar speed after s         2345       MC Speed Controller Output       -       MC speed PDI output       2344         2346       MC Speed Controller Output       -       MC catual quadrature current after Clarke transformation         2349       MC Actual Quadrature Current       -       MC actual quadrature current       2344         2344       MC Desired Uncet Current <td>2333</td> <td>MC Control Loop Maximum Duration</td> <td>s</td> <td></td>	2333	MC Control Loop Maximum Duration	s	
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2369 MC V Phase BEMF - MC V phase electromechanical force			rad	
			-	
2370     MC W Phase BEMF     -     MC W phase electromechanical force			-	
	2370	MC W Phase BEMF	-	MC W phase electromechanical force

Table 1 – continued from previous page	Table	1 - continued	from	previous	page
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**Note:** Variables with "-" unit are dimensionless and normalized.

#### CHAPTER

### THREE

## **CAN BUS PROTOCOL**

All CAN messages for **MC01** follow the same structure: a chain of bits divided in three groups:

Position	Name	Size	Description	Description	
1	CAN Id	2 bytes	If the Id match	If the Id matches with the Id of the <b>MC01</b> ,	
			the message wi	the message will be read. Otherwhise, it will be ignored	
			be ignored		
2	Mode	1 byte	It indicates wh	at kind of order is receiving	
			the MC01		
			Value	Order	
			0	Turn off	
			3	Move to the angular	
				position written in	
				Data	
			4	Move to the angular	
				speed written in	
				Data	
3	Data	3 bytes	With Mo	ode 3, it indicates the decoded	
			angular j	angular position in radians	
			With Mo	ode 4, it indicates the decoded	
			angular s	angular speed in radians per second	

The parameter that is configured in the MC01 is the CAN Id. To do it, use its respective PDI Builder and manual:

- For MC01B read the Input/Output section of the MC01B PDI Builder user manual.
- For MC01S read the Input/Output section of the MC01S PDI Builder user manual.