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# **HOW-TO**

# How-to Configure 5x3MT Keyboard in EMU PRO

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### 1. Description

This guide explains how to set up the 5x3MT Ecumaster keyboard, which is equipped with 13 ordinary buttons and 2 rotary encoders. This guide focuses mainly on the configuration options for the encoders. For more general information on CAN bus keyboard support, see the EMU PRO Software Guide: https://www.ecumaster.com/files/EMU\_PRO/EMU\_PRO\_Software\_Guide.pdf.



To configure a keyboard, click Add in the Project Tree and then select CANbus Keyboard from the list or click the keyboard icon in the toolbar. Select the 5x3MT from the *Size* menu. The window will look as follows, with encoder positions marked with a frame:

🚔 New CANbus Ke	eyboard				×
🗁 🗐 🛛 🖓					
Name:	kb_1				
Size:	5x3MT Ecumaster with 2 end	oders (RGB, 7 colors)	~ Mor	re settings	
CANbus:	CAN2 V CANopen no	ode ID: 0x0015	ID (hex): 0x195		
E 016		016	016	016	016
016		016	016	016	016
016		016	016	016	016
Export keyboar	rd state and buttons to CAN				
CANbus:	CAN2 > ID (hex): 0x060	52 🚔 Frequency [H	Hz]: 20 ▲ Save.(	CANX File	
Order Buttons					OK Cancel

Knowing the three types of encoder operations is essential for getting the best configuration:

### 1. encoder

Rotating the encoder adjusts the associated channel's value. Unlike a rotary switch, you have the flexibility to configure the encoder's range of values.

- First state the lowest encoder state
- Last state the highest encoder state
- Default state after startup, the encoder will adopt its default state

### 2. changer

Operation in *changer* mode is similar to *encoder* mode but its main use is to change pages in the ADU. Turning the encoder clockwise moves to the next page, while turning counterclockwise goes back to the previous page.

In changer mode, the LEDs illuminate in a fan-like pattern, offering a visual indication of the operating mode.

- First state the number of the first page
- · Last state the number of pages in the ADU
- · Default state after startup, the page you want to start on
- Wrap pages decide if the encoder should jump from the last page to the first and vice versa

For more information about the operation of the *changer* mode, see Example (on page 4).

### 3. parameter controller and parameter selector

You can use the keyboard encoder to control multiple settings. This is possible by setting it to *parameter controller* mode. For each setting you want to manage, select a button and set its mode to *parameter selector* mode. These selector buttons function like radio buttons, allowing you to choose one active parameter at a time that is modified by the knob.

Each *parameter selector* comes with its own range and state, updating the *parameter controller* when pressed.

- a. If there are no button presses defined as a *parameter selector*, *parameter controller* remains neutral and rotation has no effect.
- b. Pressing the button defined as a *parameter selector*, conveys the parameter information to the encoder. Encoder can change the state of the *parameter selector*.

c. After pressing the currently selected *parameter selector* button again or pressing the *parameter controller*, the encoder returns to the neutral behaviour. (Pressing any other button (not defined as a *parameter selector*) will not cause the encoder to lose control of the *parameter selector*.)

Surrounding the encoder are 16 LEDs that visually represent the current state of the encoder. Default starting LED is at 9 o'clock, numbered clockwise. To change, go to *More settings*, adjust *Start offset for encoder LEDs'* from 0 to 15, with 0 as the 9 o'clock position.

## 2. Example

We're configuring the 5x3MT to quickly navigate pages in ADU and finely adjust four parameters with the two rotary encoders. In this example, we'll use the top encoder for pages and the bottom one to control parameters.

### Changing pages in the ADU via the EMU PRO

In the keyboard settings, select the top-left box for the rotary encoder. Set it as a *changer*. Determine the following parameters:

- First state set to 1, to avoid confusion in page counting
- Last state the number of pages in the ADU (remembering that it is not updated automatically when you add or remove a page in ADU, it must be changed)
- Default state after startup, the page you want to start on
- Wrap pages decide if the encoder should jump from the last page to the first and vice versa



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To enable page changes in the ADU, both the ADU and the EMU PRO must be connected to the same CAN bus. Start in EMU PRO, by adding CAN export in the Project tree. Remember to set correct CAN bus and an unoccupied ID. Select the channel that corresponds to the keyboard encoder set up in the previous step (*k\_page\_changer* in our example).

To streamline the import in the ADU, use Save .CANX File button.

Hew CANbus T	ransmit Frame (tx)				×
0					
Name:	tx_transmit1				
CANbus:	CAN1 V ID (hex):	0x0500	Standard $\!$	DLC: 8	•
Transmit mode:	Cycle $\lor$ Fre	quency [Hz]: 50	▲ ▼		
Endian:	BIG ~				
Channel #0:	8-bit unsigned $\sim$	k_page_changer		*1 ~	]
Channel #1:	8-bit unsigned $\sim$			*1 ~	]
Channel #2:	8-bit unsigned $\sim$			*1 ~	]
Channel #3:	8-bit unsigned $\sim$			*1 ~	]
Channel #4:	8-bit unsigned $\sim$			*1 ~	]
Channel #5:	8-bit unsigned $\sim$			*1 ~	]
Channel #6:	8-bit unsigned $\sim$			*1 ~	]
Channel #7:	8-bit unsigned $\sim$			*1 ~	]
				Sav	ve .CANX File
				ок	Cancel

In the next step, import the .CANX file created in the previous step into the ADU project.

Import CANX	ïle: x_export1.canx		×
Name:	m_export1		
CANbus:	CAN1 ~		
Base ID (hex):	0x0500 ▲ Sta	ndard 🗸	
Select channels:		Show fram	es
Filter:			
✓ c_k_page_char	ger		
Select all	Select none		
		ОК	Cancel

Then assign this imported channel in the *Configuration* panel to the *Page selector channel* and set *Page selector first value* as in the EMU PRO configuration, equal to 1:

	Configuration		
D			
	Minimal ecu.map	60 kPa	^
	Tire temperature cameras		
	Tire temperature range min	40	
	Tire temperature range max	100	
	Brake temperature cameras		
	Brake temperature range min	300	
	Brake temperature range max	800	
	Min/Max reset		
	Reset min/max mode	Every firmware upgrade	
	Startup screen		
	Enable		
	Texture	EcumasterLogo.png	
	Scale	200 %	
	Duration	1 s	
	Color	(255,255,255,255)	
	Background color	(0,0,0)	
	Lap timing		
	Lap timing mode	Standard	
Ξ	Changing pages:		
L	Page selector channel	c_k_page_changer	
	Page selector first value	1	
E	Delayed turn off:		
	Turn off minimum time	0 s	
	Turn off maximum time	3 s	
	Turn off channel	one	

### **Controlling multiple parameters**

Back to the EMU PRO software, we aim to use the other encoder for controlling four parameters. Begin by selecting the bottom-left box and designate it as a *parameter controller*.

Edit Keyboard Button		Х
D 🔒 🗆 🛛		
eCanbusKeyboardButton		
Name	k_rotary	
Button type	parameter controller	
C	116	
[	OK Cancel	

Now proceed to configure each parameter. For each of the four, choose one button, change its type to *parameter selector* and set the first, last, and default states to adjust their value range.

	Edit Keyboard Button	×
D		
Ξ	eCanbusKeyboardButton	
	Name	k_traction
	Button type	parameter selector
	First state	1
	Last state	8
	Default state	1
	Inactive color	none
	Selected color	green
	0	16
	[	OK Cancel

The final setup of our example keyboard looks as follows:

🧮 Edit CANbus Ke	eyboard							×
🗁 🖬   😨								
Name:	kb_1							
Size: CANbus:	5x3MT Ecumaster with 2 CAN2 V CANopen	encoders (RGB, 7 colors) node ID: 0x0015	∨ ID (hex): 0x1	More settin	ıgs			
k_p2 char 110 016	age_changer nger 0/1, wrap: Y	016		016		016		016
016		016		016		016		016
(Definition of the second seco	otary ameter controller	k_traction parameter selector 18/1, color: NG 016		k_als parameter selector 13/1, color: NB 016		k_surface parameter selector 03/0, color: NV 016		k_brightness parameter selector 116/1, color: NW 016
CANbus: CAN2 V ID (hex): 0x0662 Frequency [Hz]: 20 Save .CANX File								
Order Buttons						(	ОК	Cancel

When the driver wishes to adjust a setting, they can press the corresponding button. The rotary encoder will activate, enabling them to change the parameter by turning it.

### 3. Document history

Version	Date	Changes
1.0	2024.07.26	Initial release