# **Custom Protocol Creation Guide**

A convenient and time-saving DIY solution for users to control pixel fixtures (two criteria apply).

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### **COMPATIBLE FIRMWARE**

Custom protocol creation is featured in the following ENTTEC pixel controllers:

Product SKU	Pixel Controller	Firmware Version
73539	DIN PIXIE	V2.0 up
70067	PIXELATOR MINI	V2.0 up
71521	ОСТО МК2	V4.0 up

## **INTRODUCTION**

ENTTEC Pixel controllers support more than 20 pixel protocols by default. In the event of missing protocol, this custom feature allows the users to create a custom protocol for the desired pixel fixture anytime without having to submit a support request for new firmware.

This feature enables users to adjust the voltage timing based on the supported protocols if the data transmission method matches any of our supported protocols.

This document provides setup instructions for creating a custom pixel protocol and verifying the criteria.

### **SETUP REQUIREMENTS**

The following are required to create a custom protocol:

- 1. **Datasheet:** Obtain the datasheet of the desired pixel fixture to gather necessary information. Contact the dealer or manufacturer for this document.
- 2. **Device:** Use a computer to access the device settings page.
- 3. **For OCTO MK2/PIXELATOR MINI:** Obtain the device IP address, which can be either DHCP or static based on your network settings. Discover the IP using the ENTTEC EMU app.
- 4. For DIN PIXIE: Use the EMU Software for configuration.

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# **GUIDE TO CUSTOM PROTOCOL CREATION**

This feature allows users to adjust the data voltage timing to meet specific protocol needs.

To create a custom protocol:

- 1. Verify datasheet for the compatible pixel protocol.
- 2. Navigate to Device's User Interface to enable custom protocol feature.
- 3. Adjust the pixel fixture's data voltage timing via the web interface as per the manufacturer's datasheet.

### Step 1: Verify datasheet for the compatible protocol

- 1. Verify the data transmission method of your desired protocol from the datasheet.
  - 1.1 The data transmission method implies how the data is forwarded. Below demonstrated the common data transmission methods:
    - a. The most common method transmits data without additional bits (e.g., D1-D2-D3...Dn).

Example: Information captured from WB2812B's datasheet



b. Some protocols, like TM1814, include additional data at the front (e.g., C1-C2-D1-D2...Dn).

Example: Information captured from TM1814's datasheet

Datasheet indicates '*Data receiving and forwarding*' with S1-S2-S3-S4 between pixel (chip)

Datasheet shows how S1, S2, S3 are transmitted with extra C1-C2 in the front of data batch.



- 2. Nominate the matching protocol supported by the device (or choose from the above example) that shares the same data transmission method of your desired pixel protocol.
- 3. Proceed to Step 2 for further configuration.

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### Step 2: Navigate to Device's Settings page to enable custom protocol feature

In this step, the OCTO MK2/PIXELATOR MINI and Din PIXIE are guided accordingly due to their distinct interfaces.

#### For OCTO MK2/PIXELATOR MINI

#### 1. Access to OCTO MK2/PIXELATOR MINI web interface

- 1.1 Google Chrome is suggested as the web browser to access the OCTO MK2/PIXELATOR MINI web interface.
- 1.2 Free ENTTEC app, EMU can be used to discover OCTO MK2/PIXELATOR MINI IP address. See ENTTEC website <u>www.enttec.com</u> to download the app.
- 1.3 After entering the IP address of OCTO MK2/PIXELATOR MINI, the user will land on the Home page of OCTO MK2/PIXELATOR MINI's User Interface.

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		Other bookmarks
ΕΝΤΤΕΟ	Home Settings Network Stats Help Update Firmware	Light
	Octo - Main	
Network Information ①		
DHCP:	Enabled	
IP Address:	10.10.3.31	
NetMask:	255.255.255.0	
Gateway:	10.10.3.254	
Mac Address:	00:30:a7:55:66:33	
Link Speed:	100 Mbps	
System Information ①		
Node Name:	Octo	
Firmware Version:	ENTTEC Octo Firmware V4.1	
System uptime:	8 secs	
Input Protocol:	Art-Net	
Output Protocol:	1 : WS2812B , 2 : WS2812B	
Personality:	Direct	

Figure 1 – Example of OCTO MK2 Home Page

Example of OCTO MK2 homepage in Figure 1 indicates IP address 10.10.3.31, which was assigned by the DHCP server. For out-of-box OCTO MK2/PIXELATOR MINI that is connected directly to a computer (no DHCP server), the default IP address is 192.168.0.10.

See OCTO MK2/PIXELATOR MINI User Manual 'Networking' section for more information.

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#### 2. Navigate to Settings page - Output Setting

Go to the output where the desired pixel fixture is connected to. Pick a pixel protocol from dropdown list that <u>shares</u> the same transmission method verified in Step 1.

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	Octo	o - Settings		_
Network Information ①				
Node Name: ①	Octo			
DHCP: ①	Use DHCP			
Static IP Address: ①	192 168	0 10		
Static NetMask; ①	255 255	255 0		
Gateway IP: ①	192 168	0 254		
Output Settings ①				
Outputs LED Protocol ①	Color Ord	er ① Mapped Pixels	s ①     Global Brightness ①	
Output1 WS2812B > 0	ustom ① RGB	× 680	Max -	
Output2 WS2812B V C	ustom ① RGB	✓ 680	Max -	
Protocols (1)				
DMX Protocol (Input): Art-Net				-

Figure 2 – Example of OCTO MK2 Settings Page

#### 3. Enable Custom protocol

Enable the 'Custom' tick box to access the data voltage timing setup. Untick to disable the custom protocol.

TTEC Octo Web Control x + C O A Not secure 10.10.3.31/#settings			_	<ul> <li>✓ - Ø ×</li> <li>☆ □ ⊕ Incognito :</li> <li>Other bookmarks</li> </ul>
ΕΝΤΤΕΟ	Но	me Settings Network	Stats Help Update Firmware	Light
Network Information	•	Octo - Set	ings	
Node Name: ①	Octo			
DHCP: ①	✓ Use DHCF	3		
Static IP Address: ①	192	168 0	10	
Static NetMask: ①	255	255 255	0	
Gateway IP: ①	192	168 0	254	
Output Settings (i) Outputs	LED Protocol ①	Color Order 🕕	Mapped Pixels ①	Global Brightness ①
Utput1 Output1 Rese	S2812B         Custom ①           High time (ns)         300           High time (ns)         750           all Bit time (ns)         1350           t time (ns)         100000	RGB •	680 Max	·
Output2	62812B T Custom (1)	RGB •	680 Max	

Figure 3 -Example of OCTO MK2 Custom field after enabling 'Custom' tick box



#### For DIN PIXIE

- 1. Connect DIN PIXIE to a computer using USB Type-B.
- 2. Launch EMU Software.
- 3. Scan for the device and click on the Conf of the discovered DIN PIXIE.

	Default Defa	ult Default Default				Eixturo	PATCH	PROGRAMS	SHOWS	INPUT	٩
						~		manager	_		-
Shart Px1 40 Dot	(6C OUTPUT	AUDIO MIDI LICEN	NSE FIXTUR	ES UPDA	TES SETTINGS	ABOUT 2: 40			5		
0 0 0 0	EMU 0 Uni	Device name	Output Type	Output Uni	Destination	Conf E	nabled				
Smart Px1 60   (4Ch) DMX13	L 1					٥					
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Figure 4 - EMU Software - Scan for device

#### 4. Enable Custom Protocol

Pick a pixel protocol from dropdown list that <u>shares</u> the same transmission method verified in Step 1 and enable Custom.

DIN Pixie 02415159: COM9						
CONFIG SEND FIRMWARE	STANDALONE					
DMX Personality:	Out1 = DMX1 :: Out2 = DMX2     •       1 DMX pixel (RGB) equals     1 Strip pixel					
DMX Start Address: (applies to DMX input only and in step LED Strip Protocol:	DMX1 Start: 1 DMX2 Start: 1					
Run Show on DMX loss:	Yes T					
(blackout after 30 secs of DMX/USB da Pixel Ordering:	ata loss) No					
(DMX Slots per LED Pixel. RGB=3. RGB Make Parameters Defaults	W=4) ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~					
	Close					

Figure 5 - DIN PIXIE Configuration in EMU



## Step 3: Set custom voltage timing

1. Match the voltage timing on the datasheet of your desired protocol. Custom Protocol requires 4 inputs to complete data voltage timing adjustment:

Voltage Timing Definition					
Bit 0 High Time (T0H)	The voltage high time required for code 0.				
Bit 1 High Time (T1H)	The voltage high time required for code 1.				
Overall Bit Time:	The total voltage time for a single bit. Lower limit = T0H+T0L Upper limit = T1H+T1L				
Reset Time	The total voltage low time required to reset the data transmission between each data batch.				



Figure 6 - Custom Voltage Timing values

Table 1 - Definition of Voltage Timing values

#### 2. Datasheet - Data voltage timing info Example

#### From WB2818B's datasheet

Locate **'Sequence Time**' table in WB2818B's datasheet for voltage timing range.

Sequence Time

TOH	0-code, High-level time	220ns~380ns	
TIH	1-code, High-level time	580ns~1µs	
TOL	0-code, Low-level time	580ns~1µs	-
TIL	1-code, Low-level time	580ns~1µs	
RES	Frame unit, Low-level time	> 280µs	

Figure 7 - Voltage Timing from WB2818B Datasheet

### **IMPORTANT**

- ENTTEC recommend taking the median value of the range for start.
- The user will have to SAVE settings for modified value to take effect.
- Fine adjustment of value required, follow by actual output test to optimise custom protocol for pixel fixture control.
- ENTTEC recommend a trial run on the actual setup before finalising the custom protocol setup.
- Typical issue of incorrect setup includes and not limited to failure to light up and output flickering.

### **CONCLUSION**

This guide demonstrated how to set up a custom protocol for eligible ENTTEC devices and provided technical knowledge on verifying the datasheet of your desired pixel fixtures.

By following these steps, users can create a custom pixel protocol not found in the drop-down list without waiting for technical support or a new firmware release. If you have questions or difficulty finding the right information, reach out to our friendly support team at the local offices.



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Fill the voltage timing range in the custom field in Output Settings.



Figure 8 - Datasheet information interpreted into LED Protocol's custom field