

## Vesta IoT Gateway

The **Vesta IoT Gateway** from Rigado is a powerful, highly integrated Gateway based on the i.MX6ULL Processor from NXP. With 512MB of DDR3 memory, an ARM® Cortex™ A7 CPU, 10/100 Ethernet, 802.11n Wi-Fi, Bluetooth 5 (including Classic and LE), and Thread support, Rigado's **Vesta Gateway** provides a complete IoT connectivity solution with excellent edge compute capability.

Versatile mounting hardware and flexible power input options, including: 5V DC barrel jack and Power over Ethernet (PoE), makes for quick and easy installation.

The **Vesta-500 Gateway** is the latest upgrade to our **Vesta** line of Yocto Linux based Gateways. For more information on our managed solutions, please visit <https://www.rigado.com/products/iot-edge-as-a-service/>.



### 1. Features

- Based on the NXP i.MX6ULL ARM® Cortex™-A7 32-bit Application Processor, @ 800MHz
- Complete RF solution with integrated antennas
- Dual Band (2.4 and 5 GHz) 802.11a/b/g/n/ac Wi-Fi
- Bluetooth® 5 (includes Classic and Low Energy) with amplifier for increased range
- 802.15.4 with THREAD support
- 10/100 Ethernet with 802.3af PoE
- USB 2.0 Host connector
- 512MB DDR3L (x16, @400MHz)
- 8GB eMMC
- User Button – SW definable
- Status LED – SW definable
- System Reset – hard & soft reset capability
- 5VDC input
- 0°C to 60°C operating temperature range
- Yocto Linux (SDK provided)
- Drivers for THREAD and BLE interfaces
- Internal debug port for development
- Security capability: Secure Boot, TRNG, Crypto Engine, OTF DRAM encryption
- Dimensions: 127 x 127 x 30mm
- Wall and ceiling mount options
- FCC/ISED/CE/Bluetooth® SIG

### 2. Applications

- IoT Gateway
- Smart Appliances
- Home Energy Management
- Human-Machine Interface (HMI)
- Intelligent Industrial Control Systems



## 3. Ordering Information

Email [info@rigado.com](mailto:info@rigado.com) for quotes and custom orders, or visit [www.rigado.com/products/iot-gateways](http://www.rigado.com/products/iot-gateways)

### Vesta IoT Gateway (Part#: 900-00057)

- **Vesta-500 Gateway** (Part#: 810-00032)
- **Wall/Ceiling Mount Kit** (Part#: 820-00027)
  - Vesta Mounting plate
  - Vesta Mounting backer plate
  - Drywall Anchor, #6-#8 Screw, 1-1/4" Length
  - M3 x 50 mm Length, Pan Head, Phillips #1, Machine Screw
  - #6 x 1-1/4" Length, Flat Head, Phillips #1-#2, Wood Screw

### Accessories

- 5V, 2A (10W) AC/DC Wall Adapter (Part#: 820-00029)

## 3.1 Hardware Revision/Errata

Please visit [developer.rigado.com](http://developer.rigado.com) for release notes and errata.

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## 4. Specifications

Processor		
i.MX6ULL (Y2)	800MHz, 32bit ARM® Cortex™-A7	
Memory		
Memory (Volatile)	512 MB DDR3L SDRAM @ 400MHz, x16	
Memory (Bulk Storage)	8GB eMMC	
Wi-Fi (802.11a/b/g/n/ac)		
Frequency	2.412GHz - 2.472GHz; 5.180GHz – 5.95GHz (region dependent)	
Modulations	DSSS, FHSS   OFDM	
Transmit Power	19 to 12.5dBm for 2.4GHz band, 15 to 8dBm for 5GHz band, depending on modulation	
Receiver Sensitivity	-98 to -72dBm for 2.4GHz band, -92 to -68dBm for 5GHz band, depending on modulation	
Antenna	Integrated Dual-band Antenna	
Bluetooth		
<b>BMD-345 Module</b>		
Bluetooth Version	5 (Bluetooth Low Energy)	
LE Connections	Up to 20 connections	
Frequency	2.402 to 2.480 GHz	
Modulations	GFSK at 1Mbps, 2Mbps data rates	
Transmit Power	12dBm	
Receiver Sensitivity	-108 to -98dBm, depending on modulation	
Ethernet		
10/100 Base-T RJ-45 connector with PoE Support		
USB		
USB 2.0, A-type Host connector		
Dimensions		
Vesta Enclosure	Length	127 mm
	Width	127 mm
	Height	30 mm
Hardware		
Power supply	4.5 to 5.5VDC, 2A max via Barrel Jack (5.5mm x 2.1mm)	36-57V (IEEE 802.3af) via Ethernet connector (RJ-45)
Temperature Range	0 to +60°C	
Certifications		
FCC / ISED / CE-RED / Bluetooth SIG		

Table 1 – Specifications

## 5. Hardware

The key interface features are described throughout this section, including power and data connectivity, as well as button and LED location and behavior.

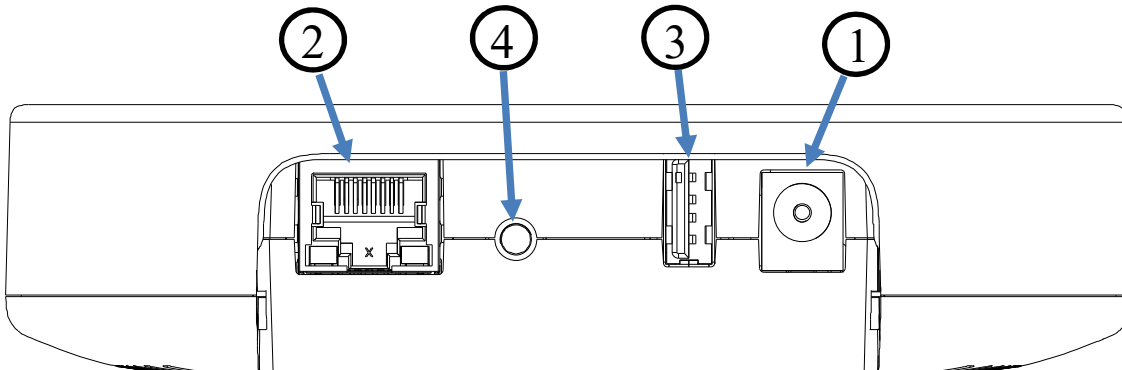


Figure 1 – Vesta Hardware – Back View

### 5.1 Power

#### 5.1.1 Barrel Jack ①

All available configurations provide a 5.5mm x 2.1mm barrel jack for 5V DC input. The AC/DC wall adapter shipped with most gateway configurations is rated up to 2A. Please note that the actual current consumption is highly dependent upon the unit configuration and programmed software.

#### 5.1.2 Power over Ethernet ②

For configurations supporting PoE (802.3af), the Vesta Gateway will operate when powered by either a PoE switch (end-span) or injector (mid-span).

### 5.2 Ethernet ②

All available configurations provide a single 10/100 Base-T Ethernet connector.

### 5.3 USB ③

A USB 2.0 Type-A connector on the Vesta Gateway board provides access to a High Speed (up to 480Mbps) USB host. This connector is also used for downloading a boot image with the NXP MFGTool in Serial Download Mode. See [developer.rigado.com](http://developer.rigado.com) for more information on the update process.

### 5.4 Reset ④

The reset button provides both soft and hard reset capabilities, depending on the length of the press. The soft reset behavior is firmware dependent. The hardware timing is described in the following table:

Reset Action	Time	Behavior
Quick Press	Momentary	FW dependent
Short Press	< 5 seconds	FW dependent
Long Press	6-9 seconds (7.5sec +/- 20%)	System Reset (power cycle)
Very Long Press	> 40 seconds (9sec + boot time)	FW dependent

Table 2 – Operating Conditions

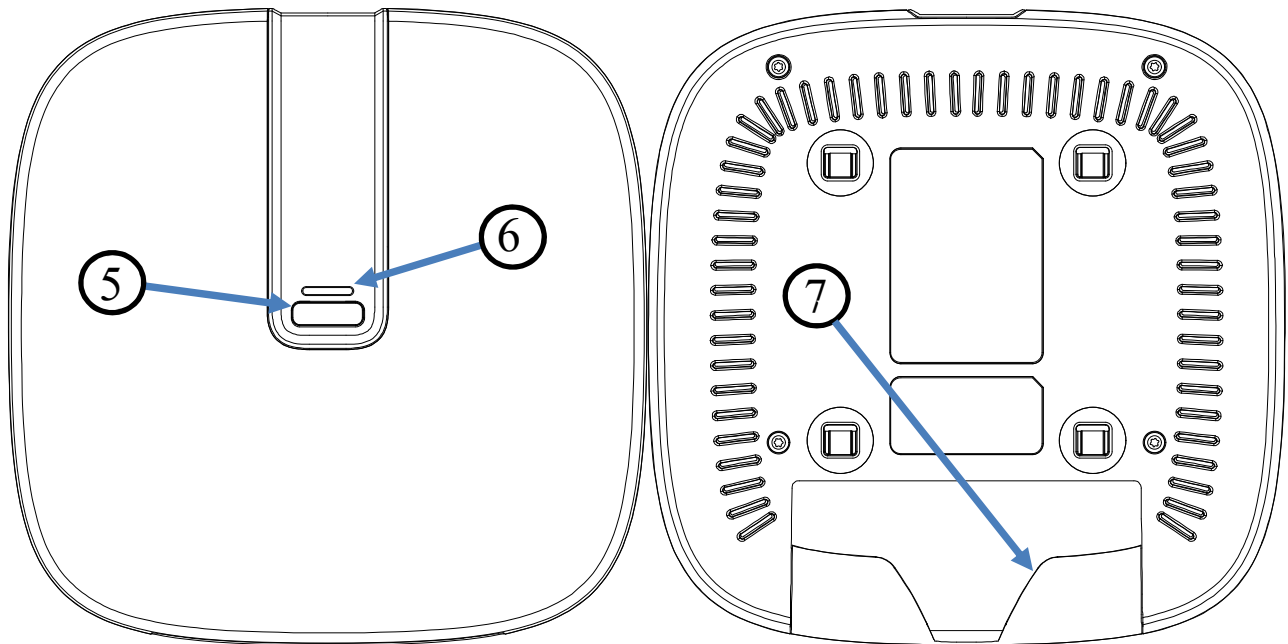


Figure 2 – Vesta Hardware – Top and Bottom View

## 5.5 User Button (5)

A momentary user button is available as a software defined user input. Depending on the boot configuration, this button can also enable Serial Download mode if it is held down during a reset. See [developer.rigado.com](http://developer.rigado.com) for more information on the update process.

## 5.6 Multi-color LED (6)

A multi-color (red/green) LED located near the button provides a configurable means of visual indication for the user. The red and green LEDs are controlled by PWM outputs from the processor.

For more information regarding default LED behavior, please refer to [developer.rigado.com](http://developer.rigado.com).

## 5.7 Cable Cover (7)

The back of the unit has a snap-in cover for improved cable management. This allows for hidden cable routing when the unit is installed on a wall or ceiling. The cable cover is removable.

## 6. Electrical Specifications

### 6.1 Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>AUX</sub>	Operating supply voltage at barrel jack	4.5	5.0	5.5	V
V <sub>POE</sub>	Operating supply voltage at Ethernet connector (PoE)	36	48	57	V
T <sub>A</sub>	Operating ambient temperature	0	25	60	°C

Table 3 – Operating Conditions

### 6.2 USB Connector Power

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>USB</sub>	Operating output voltage at USB connector for loads up to 500mA <sup>1</sup>	4.5	5.0	5.5	V

Table 4 – USB Connector Power

### 6.3 Power Consumption

Symbol	Parameter	Min.	Typ.	Max.	Unit
P <sub>5V</sub>	Power consumption <sup>2</sup> referenced at 5V input (5V_IN)		1	10	W

Table 5 – Operating Conditions

### 6.4 Absolute Maximum Ratings<sup>3</sup>

Symbol	Parameter	Min.	Max.	Unit
V <sub>AUX_MAX</sub>	Voltage at barrel jack <sup>4</sup>	-5	12	V
V <sub>POE_MAX</sub>	Voltage at Ethernet connector (for PoE)	-0.3	60	V
T <sub>S</sub>	Storage temperature	-20	70	°C

Table 6 – Absolute Maximum Ratings

1. USB is an output only – the unit will not run from power supplied to the USB port
2. Power consumption is very dependent upon the unit configuration (SKU) and the application. MAX power for units without a USB load is about 3W (600mA@5V in).
3. Do NOT operate the unit under these conditions.
4. The unit will NOT operate over this voltage range. Prolonged exposure to these conditions is also NOT recommended.

## 7. Module Connectivity

To facilitate use of the low power wireless module on the gateway, the following table details signal names and pin mapping. The low power wireless module used in the **Vesta IoT Gateway** is based on the Nordic nRF52840 chipset.

BMD Pin	Signal Description	Type*	Schematic Signal Name	Target	
P0.02	Blue LED control (in main user LED)	DO, L	BTLE_LED_N	Blue LED next to the user button (in the same light-pipe as the red/green LED connected to the Application Processor).	This recommended for debug only since it will mix with LEDs controlled by AP.
P0.03	Input supply voltage divider	AI	ADC_IN0	Main 5V Input Supply	This is 2.5V nominal (5V input divided by 2).
P0.12	Coexistence signal	DI, H	BTLE_SUPPRESS	Wi-Fi module	Additional information on Wi-Fi coexistence may be requested from Rigado
P0.27	Coexistence signal	DO, H	BTLE_PRIORITY		
P0.26	Coexistence signal	DO, H	BTLE_RF_ACTIVE		
P0.00/XL1	32.768kHz slow clock	AI	XL1	32.768 kHz crystal	
P0.01/XL2	32.768kHz slow clock	AO	XL2		
P0.31	Flash chip select	DO, L	BFLASH_CS_N	NOR Flash Memory (U1002), pin 1	NOR Flash is NOT populated
P0.29	Flash data	DI	BFLASH_DO	NOR Flash Memory (U1002), pin 2	
P0.22	Flash data	DO	BFLASH_DI	NOR Flash Memory (U1002), pin 5	
P0.20	Flash clock	DO	BFLASH_CLK	NOR Flash Memory (U1002), pin 6	
SWDIO	Programming/debug data signal	DI, DO	SWDIO	Programming header (J1001), pin 2 Applications Processor (GPIO3_IO13), pin B11	Linux pins: 77 (SWDIO) 78 (SWCLK)
SWCLK	Programming/debug clock signal	DI	SWCLK	Programming header (J1001), pin 4 Applications Processor (GPIO3_IO14), pin A11	
P0.06	UART data	DO	BTLE_UART_TX	Applications Processor (UART3_RX), pin H16	Linux interface: /dev/ttyxc2
P0.08	UART data	DI	BTLE_UART_RX	Applications Processor (UART3_TX), pin H17	
P0.07	UART flow control	DI, L	BTLE_UART_CTS	Applications Processor (UART3_CTS), pin H15	
P0.05	UART flow control	DO, L	BTLE_UART_RTS	Applications Processor (UART3_RTS), pin G14	
P0.28	GPIO	DI, DO	BTLE_GPIO	Applications Processor (GPIO4_IO23), pin E2	Linux pin: 119
RESET/0.18	Module reset	DI, L	BTLE_RST_N	Applications Processor (GPIO3_IO5), pin B9	Linux pin: 69
P0.11	SPI clock	DI	ESPI1_CLK	Applications Processor (GPIO3_IO25), pin C14	Linux interface: Not currently supported
P0.14	SPI chip select	DI, L	ESPI1_CSN	Applications Processor (GPIO3_IO26), pin B14	
P0.16	SPI data	DI	ESPI1_MOSI	Applications Processor (GPIO3_IO27), pin A14	
P0.21	SPI data	DO	ESPI1_MISO	Applications Processor (GPIO3_IO28), pin B16	

Table 7 – Low Power Wireless Module Pinout

\*Type Key:

- AI = Analog Input
- AO = Analog Output
- DI = Digital Input
- DO = Digital Output
- H = Active High
- L = Active Low



## 8. Mechanical Data

### 8.1 Vesta Dimensions

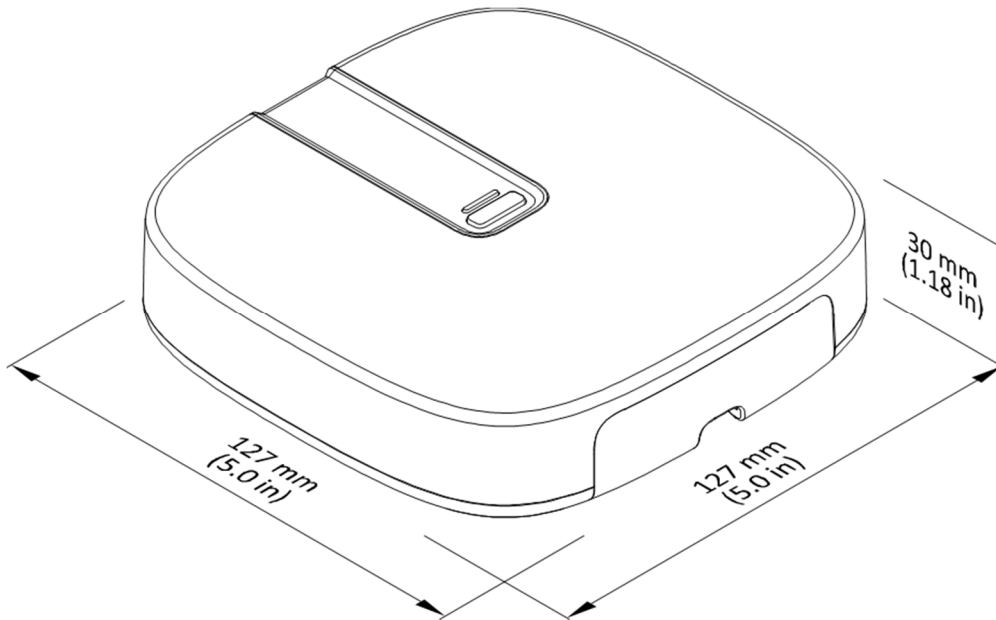


Figure 3 – Vesta Gateway Dimensions

## 9. Bluetooth Qualification

The Bluetooth modules are qualified as a Bluetooth Component (tested) for RF-PHY. This allows customers to use different Bluetooth stacks that have been qualified by Nordic or NXP without the need to complete additional RF-PHY testing. To achieve Bluetooth End Product qualification, the Rigado RF-PHY QDID can be combined with Nordic Semiconductor's Link and Host layer QDIDs used when filing on the Bluetooth SIG website. The only testing required is for the Bluetooth profiles supported by the Gateway's applications. Applications with only custom profiles do not require any additional testing.

- BMD-345: RF-PHY v5 Component (Tested) Declaration ID **D040774**/ QDID **114712**

## 10. Regulatory Statements

### 10.1 FCC Statement:

This device has been tested and found to comply with part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Operation is subjected to the following two conditions: (1) This device may no cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Note: Modification to this product will void the user's authority to operate this equipment.

**Note: Modification to this product will void the users' authority to operate this equipment.**

### 10.2 ISED (IC) Statement:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF exposure warning: The equipment complies with RF exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Avertissement d'exposition RF: L'équipement est conforme aux limites d'exposition aux RF établies pour un environnement incontrôlé. L'antenne (s) utilisée pour ce transmetteur ne doit pas être co-localisée ou fonctionner en conjonction avec toute autre antenne ou transmetteur.

## 10.3 CE Regulatory

The Vesta Series IoT Gateways are tested and compliant against the following standards.

- ETSI EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013
- ETSI EN 300 328 V 2.1.1
- ETSI EN 301 489-1 V 2.1.1
- ETSI EN 301 489-17 V 3.1.1
- ETSI EN 301 893 V 2.1.1
- EN 62311:2008

Declarations of Conformity and supporting test reports are available upon request.

## 11. Unit Labeling

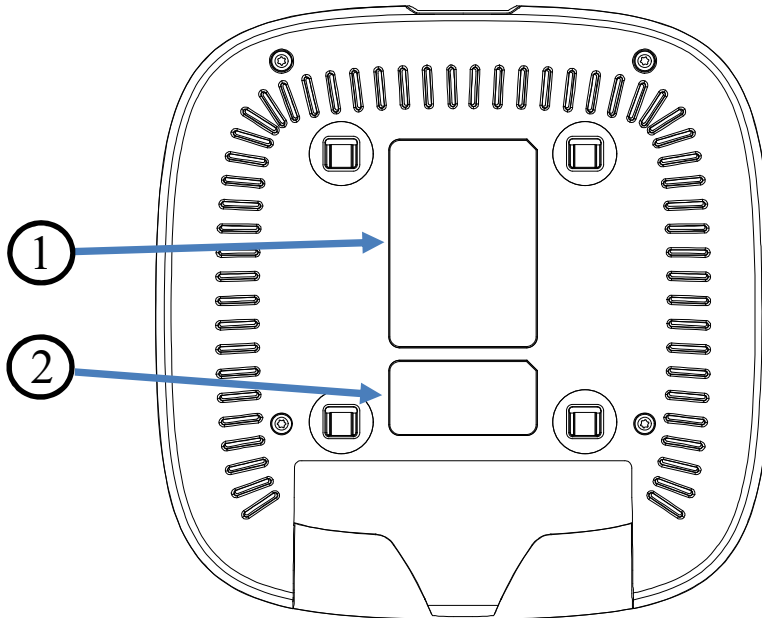


Figure 4 – Vesta Enclosure – Label Locations

- ① The larger label on the bottom face of the unit contains relevant certification markings and ID numbers. Example label:



Figure 5 – Example Certification Label

- ② The smaller label on the bottom face of the unit contains the model number and serial number. Example label:



Figure 6 – Example Serial Number Label

## 11.1 Box Labeling

The box label also contains product numbering information, including model number and serial number. Example label:



*Figure 7 – Example Box Label*

## 12. Warranty

Rigado offers a 1-year limited warranty for all Vesta Series products.

## 13. Cautions

- 1) The guidelines of this document should be followed to ensure proper performance of the product.
- 2) This product is for use in office, business, and residential applications.
- 3) Supply voltage to the product should not be higher than the specified inputs or reversed. Additionally, it should not contain noise, spikes, or AC ripple voltage.
- 4) Do not open the product enclosure.
- 5) This product should be kept away from direct heat, both during storage and after installation.
- 6) Do not drop or physically shock the product.
- 7) Do not damage the interface surfaces of the product.
- 8) The product should not be mechanically stressed at any time (storage, handling, installation).
- 9) Do not expose this product to:
  - Humid or salty air conditions
  - High concentrations of corrosive gasses.
  - Temperatures lower than -20°C or higher than 70°C.

## 14. Life Support Policy

This product is not designed to be used in a life support device or system, or in applications where there is potential for a failure or malfunction to, directly or indirectly, cause significant injury. By using this product in an application that poses these risks, such as described above, the customer is agreeing to indemnify Rigado for any damages that result.

## 15. Document History

Revision	Date	Changes / Notes
1.0	2017-8-11	Initial release
1.1	2017-10-13	Correct part numbers in Ordering Information
2.0	2018-8-24	Updates throughout to align with model consolidation to Vesta-500

## 16. Related Documents

Please refer to [developer.rigado.com](http://developer.rigado.com) for additional information.