



Installation Guide



RMK 002

Document Version 1.1
May 16, 2023

Revision History

Document Revision Number	Description	Date
1.0	Initial Release of this document format	May 16, 2023
1.1	Minor clarification in Task 2: Connect the cable of one antenna to the Turntide controller inside the RTU.	May 16, 2023

Conventions

Bold	Used in procedures for names of interface elements, such as buttons, fields, and menu items.
<i>Italics</i>	Used for emphasis, typically when introducing a new concept.
Note:	Indicates information that can help a customer make better use of a Turntide product.
Caution icon 	Indicates an instruction that draws attention to the risk of damage to the product, process, or surroundings.
Warning icon 	Indicates an instruction that draws attention to risk of injury or death and tells the customer how to avoid the potential problem.

Legal

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Audience

The instructions in this guide are intended for a mechanical technician who is used to working with commercial HVAC equipment but may not be used to working with networking equipment (Cloud connectivity and wireless networks).

You will have access to Remote Support from Turntide Technical Services:

877.776.8470 (877-PRO-TIP+)

support@turntide.com

Review this installation guide and follow all local and national electrical codes, safety compliance requirements, and common installation procedures

RMK Placement with Multiple Commercial HVAC Equipment Units

Determining the location of RMKs on a rooftop with multiple RTUs is known as ***developing the network architecture***. If this information is not provided to you by your Turntide representative, see the **INST201** course on Turntide Academy. Please contact Technical Services if you need assistance regarding a network architecture.

RMK Codes

WWW -	XXX -	YY -	ZZ
Family	Type	Country Code	Range
RMK - Remote Monitoring Kit	001 - Cloud Monitoring via customer internet	CA - Canada	None - standard range <= 40ft (12 m)
KIT - Kit of parts for field install	002 - Cloud Monitoring via cell modem	US - United States	LR - RMK+ long range <=250ft (76 m)
	003 - Cloud Energy Monitoring via cell modem	CO - Columbia	Only available in US and Canada
	004 - Cloud Energy Monitoring via customer internet	CL - Chile	
	RMK - RMK+ upgrade kit for standard RMK	None - United States	
	Only used when WWW = KIT		

Overview

A Remote Monitoring Kit (RMK) typically consists of the cellular modem and a Turntide Supervisor controller. The RMK product is the primary means of connecting a motor controller to the Turntide Cloud applications using Wi-Fi and cellular 4G communications.

This Kit includes everything needed to connect a Turntide® Smart Motor Systems™ to the internet. Once an internet connection is established, the RMK will automatically connect to the Turntide Secure Cloud platform to provide you remote access to your equipment data.

RMK Signal Radius

Use the following signal radius distances *only as guidelines*. Actual radius depends on signal strength, which is also affected by such factors as physical barriers and signal interference.

- RMK-### = 40ft radius (Instructions in this guide)
- Appended with **LR** for long-range = 250ft radius

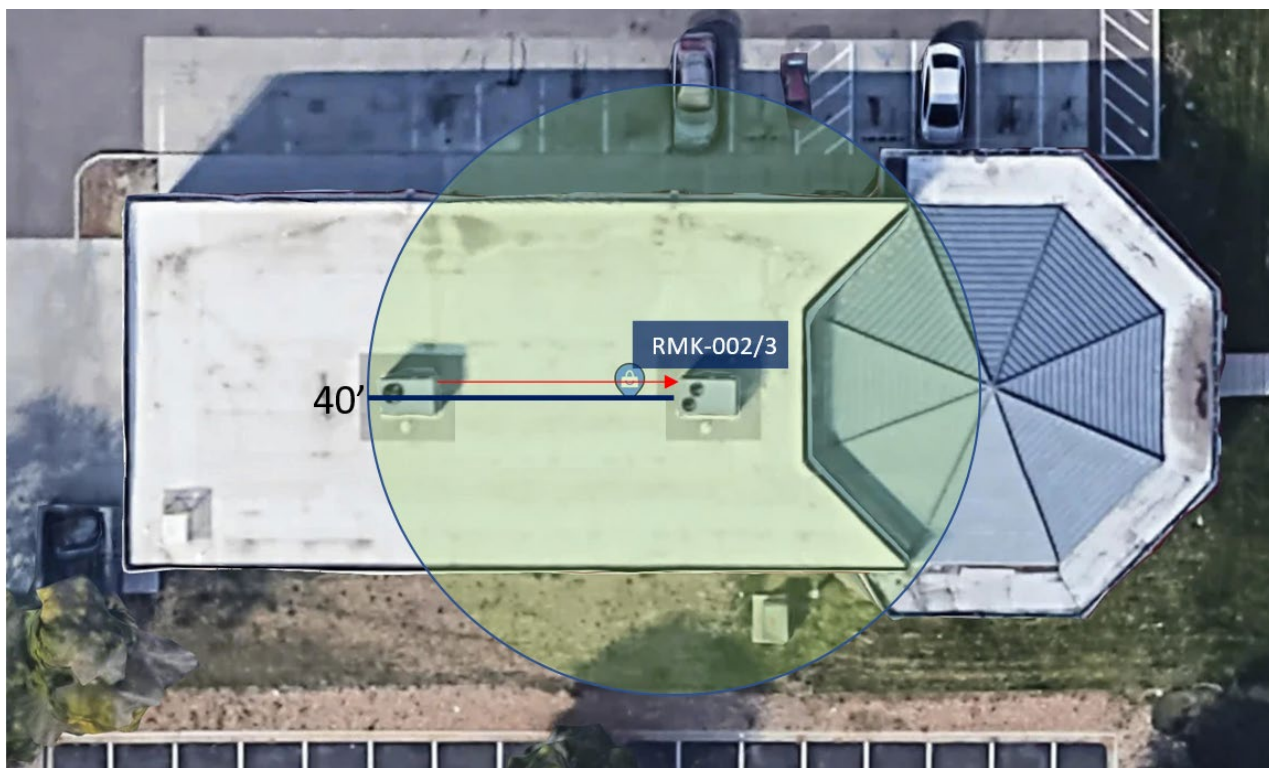
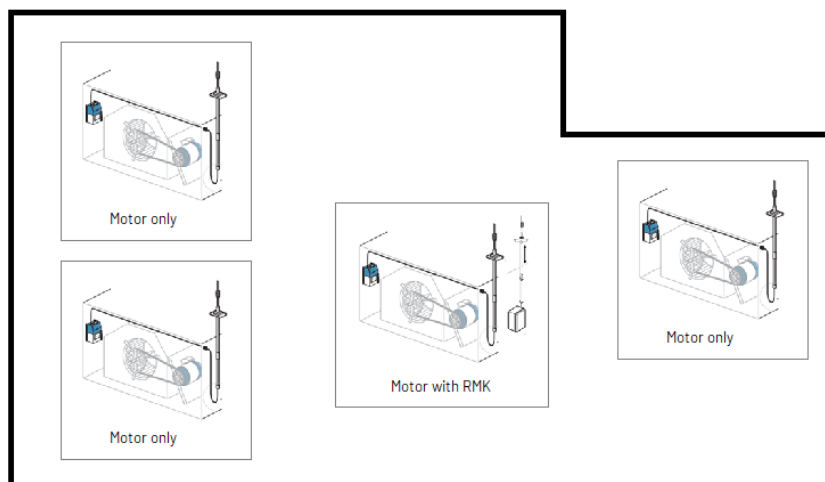


Figure 1 RMK-### = 40ft radius

General Concept Example of 4 RTUs on Roof

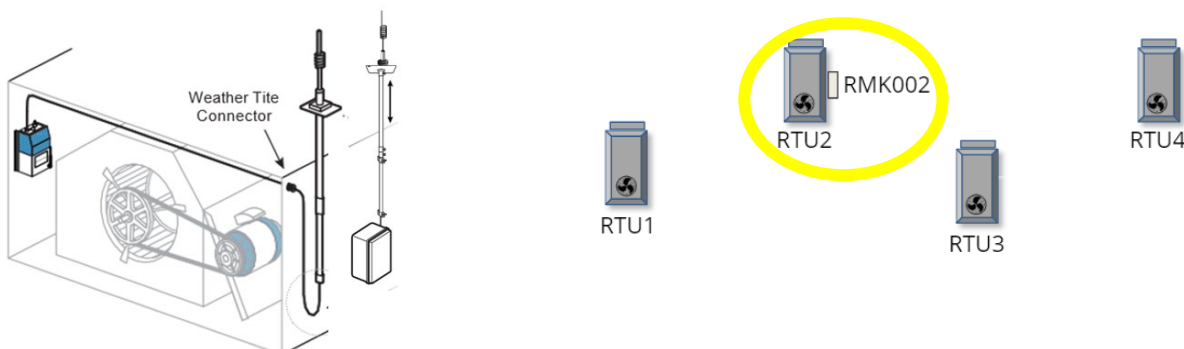
An external Wi-Fi antenna with 3m cable comes in **Box 3** of each **Turntide Smart Motor System** shipment.

If you are going to install an RMK, you need to install the external Wi-Fi antenna on each RTU that will have a Smart Motor System **wirelessly** connected to the RMK. You will install the **antenna riser** and run the 3m cable through that conduit and through the RTU to finally connect it to the Turntide Motor Controller.



Note that you must **remove** the small pre-installed antenna on P06 and SL121 motor controllers and replace it with the external Wi-Fi antenna with 3m cable from Box 3 of each Turntide Smart Motor System shipment.


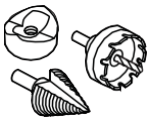


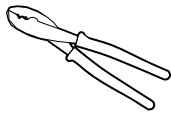
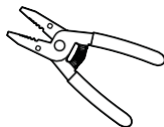

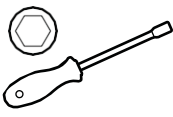


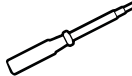
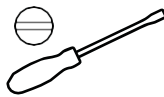

You will then install the RMK on **one of the RTUs that is centrally located**. This requires you to **install two antenna risers**, each with the external Wi-Fi antenna. The instructions are provided **after** this section.



Note: For instructions on installing an antenna on each RTU with an existing Turntide Motor Controller System that will wirelessly connect with the central RTU with the RMK, see [Appendix](#) of this guide.

Tools You'll Need

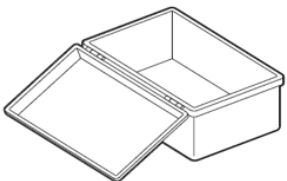
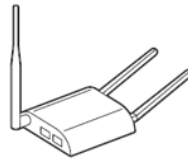
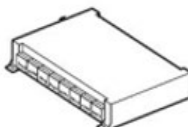
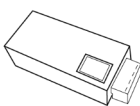
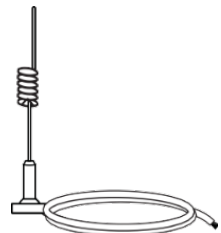
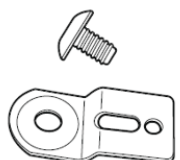


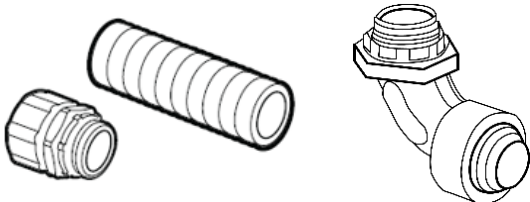
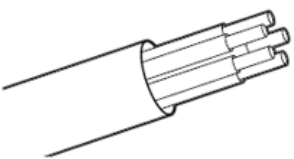
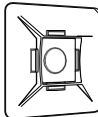
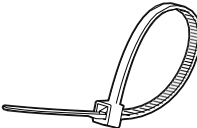
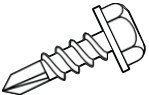
The following common tools are required to install the Turntide Remote Monitoring Kit. Every application is different, and additional tools may be required.

 <p>Cordless Drill</p>	 <p>Unibit Hole Saw Knockouts for 1/2", 3/4" & 1" EMT</p>	 <p>Drill Bit Index up to 1/2"</p>	 <p>Clamp Amp Meter</p>
 <p>Terminal (Spade) Crimp Tool</p>	 <p>Wire Strippers</p>	 <p>Multimeter</p>	 <p>Nut Driver 1/4" and 5/16"</p>
 <p>Adjustable Pliers</p>	 <p>Needle Nose Pliers</p>	 <p>Screwdriver Small terminating</p>	 <p>Screwdriver Slot</p>
 <p>Screwdriver Phillips</p>			


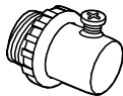
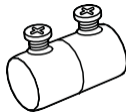
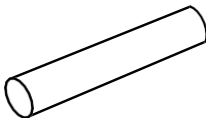
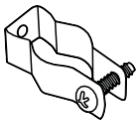
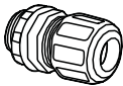
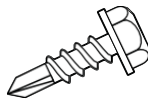
Included in the RMK Kit

Remote Monitor Kit components and antenna riser components.

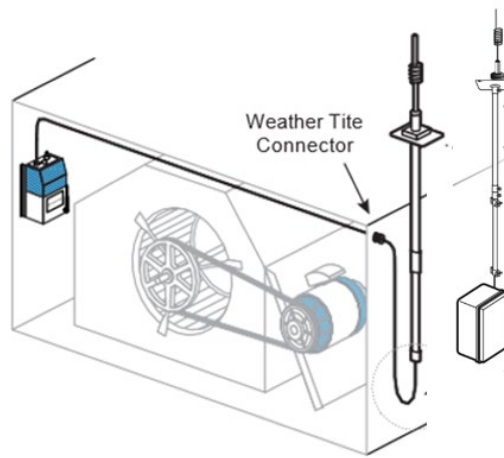
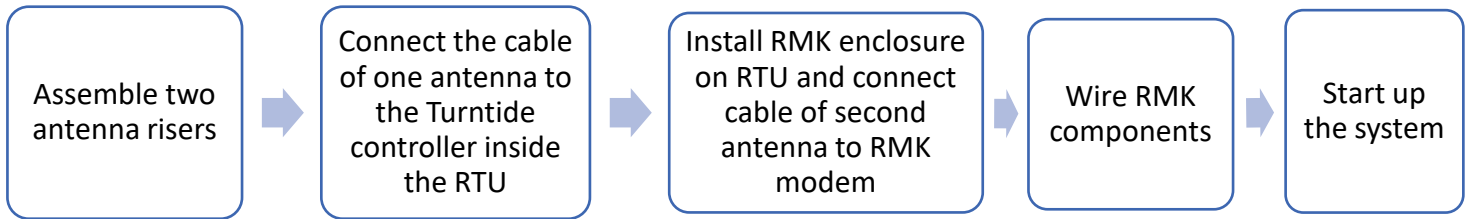
Remote Monitoring Kit

 <p>NEMA-4X Enclosure</p>	 <p>Modem</p>	 <p>Turntide Supervisor</p>	 <p>24AC/DC to 12VDC Convertor</p>
 <p>External Wi-Fi antenna with 3m wire</p>	 <p>Mounting Brackets w/Screws Qty 4</p>	 <p>Piggyback Spade Connectors Blue Qty 2</p>	 <p>Wire Nuts Blue Qty 3</p>
 <p>Liquid-Tight Conduit & Connectors 5' – 3/4" Flexible Conduit Qty 2 – Straight Connectors Qty 2 – 90-degree Connectors</p>		 <p>10' - 18/2 low voltage power cable Qty 1</p>	
 <p>Cable Tie Bases Qty 4</p>	 <p>Cable Ties Qty 10</p>	 <p>Self-drilling screws #10 x 3/4" Qty 8</p>	

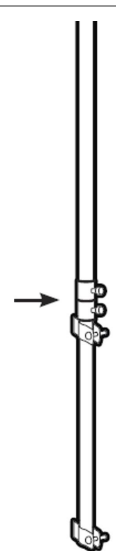
Antenna Riser Components

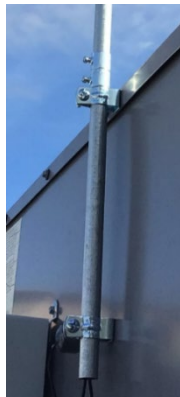
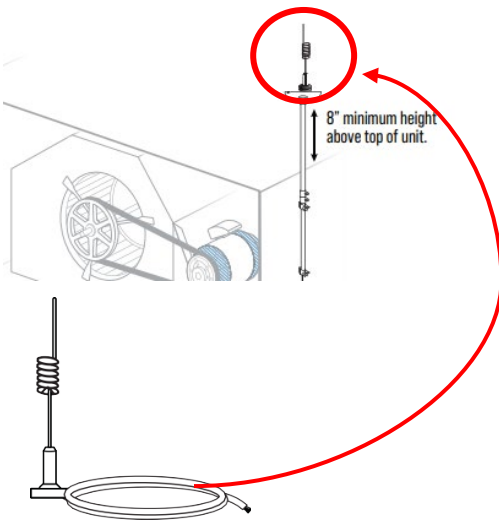
 <p>Electric Box Cover Qty 1</p>	 <p>1/2" EMT Connector Qty 1</p>	 <p>1/2" EMT Coupling Qty 1</p>	 <p>1/2" x 12" EMT Conduit Qty 2</p>
 <p>1/2" Conduit Hanger Qty 2</p>	 <p>Weather Tite Connector Qty 1</p>	 <p>Self-drilling screws #10 x 1/2" Qty 2</p>	

How to install an RMK unit and two antenna risers on the central RTU

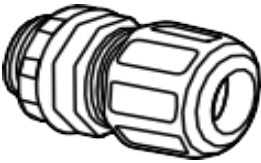
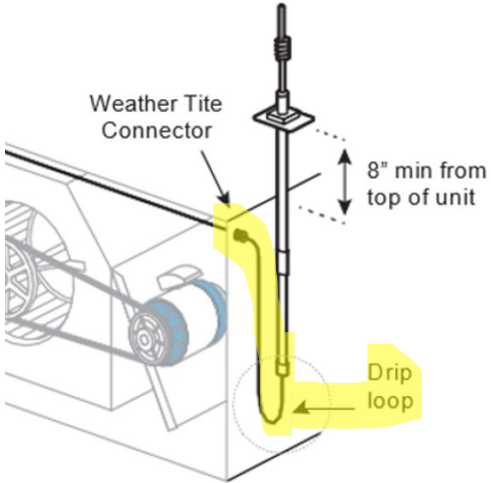
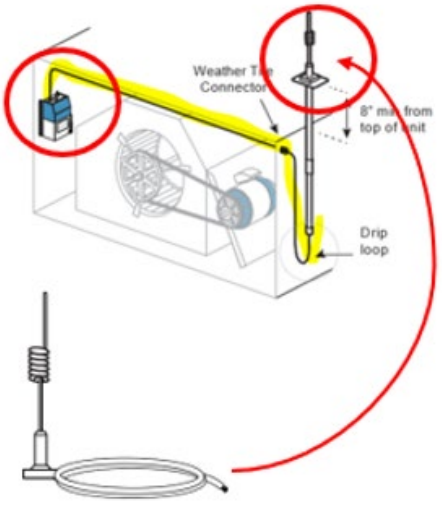


Task 1: Assemble the antenna risers

<p>1</p>	<p>Connect the two EMT conduit sections using the EMT coupling. Do this for each antenna riser because you will need to attach two antenna risers to the RTU.</p> <ul style="list-style-type: none"> • One antenna riser comes in the RMK kit. • Another antenna riser is in Box 3 of the Turntide Motor Systems installation package that was shipped to install the motor and controller. <p>The Turntide Academy video at this URL point https://youtu.be/nTHIVFat8Bw?t=72 provides instructions for assembling the couplings.</p>	
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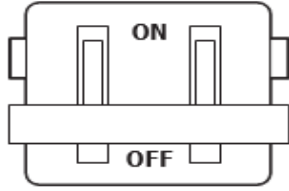
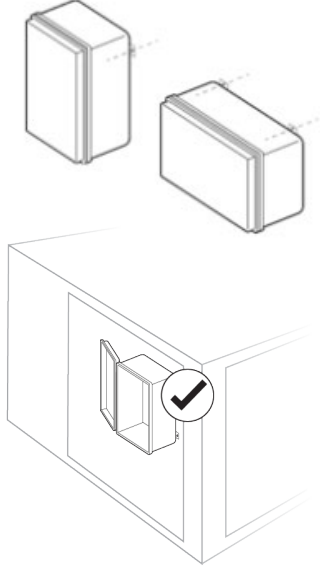

<p>2</p>	<p>Attach the two assembled antenna risers to a non-removable panel of the HVAC unit using the two conduit hangers and sheet metal screws. The EMT conduit should be screwed/bolted to the side of the HVAC unit (rooftop unit).</p>	
<p>3</p>	<p>On each antenna riser:</p> <ol style="list-style-type: none"> 1. Install the external Wi-Fi antennas with 3m cable on top of each EMT conduit base. 2. Route the 3m cable of each antenna through their respective EMT conduit. <p>In later steps:</p> <ul style="list-style-type: none"> • You will screw the cable of one antenna into the Turntide controller. • You will connect the cable of the other antenna to the modem in the RMK enclosure. 	

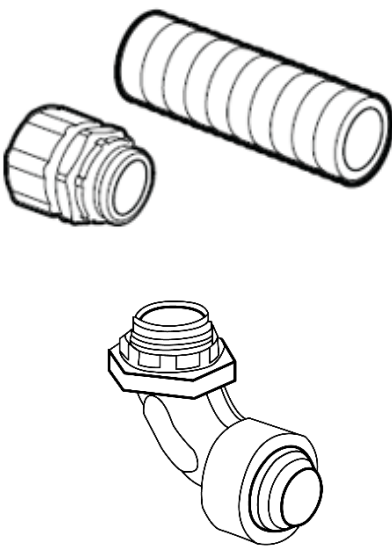


Task 2: Connect the cable of one antenna to the Turntide controller inside the RTU

1	Drill a 7/8" hole into the side of the RTU and install the Weather-Tite Connector .	
2	<ol style="list-style-type: none"> 1. Route the antenna coax cable through the Weather-Tite Connector. 2. Tighten the connector over the coax only enough to grip the coax. Do not overtighten. 3. Fill the connector with silicone caulk. 4. Ensure you have a drip loop between the cable from the EMT conduit and the connection into the RTU. 	
3	<ol style="list-style-type: none"> 1. Route the antenna coax cable through the RTU. 2. Note that you must first remove the small pre-installed antenna on the P06 and SL121 motor controllers. 3. Screw the 3m antenna cable into the Turntide motor controller. 	
You have completed this task.		

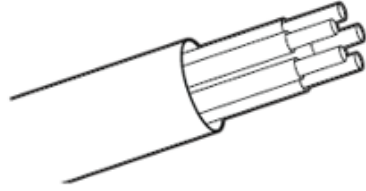
Task 3: Attach the RMK NEMA enclosure to the RTU enclosure

Before connecting the cable of the other antenna, you will need to install the RMK.

1	Turn OFF the power to the unit.	
2	<p>Install the enclosure near the unit control panel either with vertical or horizontal <i>orientation</i> using the external brackets and self-tapping screws.</p> <p>For a video demonstration, see the RMK Mounting video from Turntide Academy.</p> <p>You must install the enclosure on a vertical section of the HVAC unit (rooftop unit). RMKs should NOT be installed on the top of an HVAC unit (rooftop unit) because this leads to serious risk of water ingress.</p>	  <p>Mounting brackets</p>

<p>3</p>	<p>Drill a 1-1/8" hole in the bottom of RMK enclosure and install the 3/4" Liquid-Tight conduit and the connectors from the RMK to the control cabinet.</p> <p><i>Two straight connectors and two 90-degree connectors are provided to accommodate any installation scenario.</i></p> <p>Important: Never drill through the top of the RMK enclosure. <i>If access at the bottom of the RMK enclosure is not possible, you can alternatively drill the hole through the side of the enclosure.</i></p>	
<p>4</p>	<p>Drill a 7/8" hole into the bottom of the RMK enclosure and install the Weather-Tite Connector.</p> <p><i>Side entrance if bottom not possible.</i></p>	
<p>5</p>	<p>Route the antenna coax cable from the other antenna through the Weather-Tite Connector and form a drip loop. Tighten the connector over the coax only enough to grip the coax. Do not overtighten. Fill the connector with silicone caulk.</p>	

- 5** Route the 18-2 wire from the RTU electrical cabinet through the 3/4" **Liquid-Tight conduit and the connectors** and into the RMK enclosure.



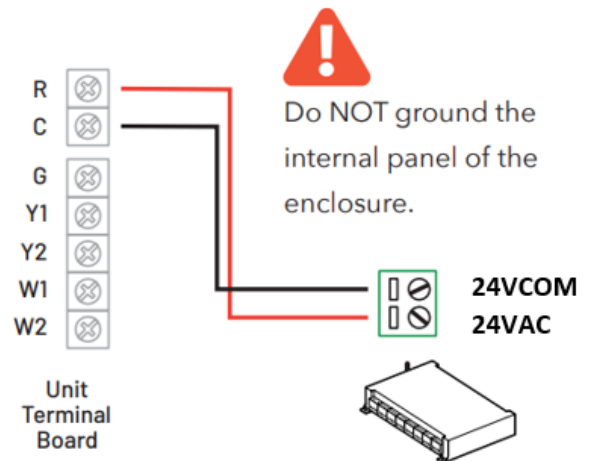
Task 4: Wire the components

Reminder: Turn OFF the power to the unit before you begin.

- 1** Install new wires from **R** and **C** on the RTU to **24 V** terminal on the **Turntide Supervisor**:
1. Install **R** to the **24VAC** and **C** to the **24VCOM**.
 2. Leave the existing wires for the AC to DC converter on the terminals.

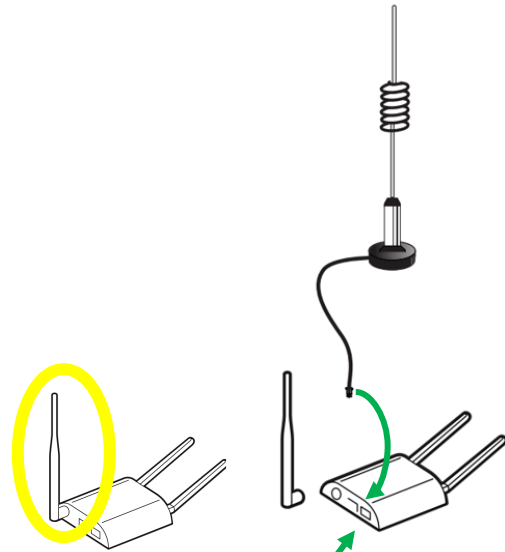
See [Figure 2 Wiring RMK 002](#).

Note: **24 V** wiring is polarity sensitive. If wiring is terminated incorrectly, it will damage the Turntide Supervisor or the control transformer.



2

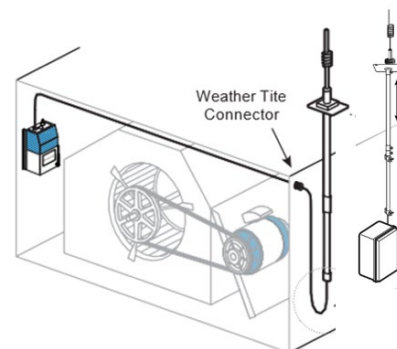
1. In the RMK enclosure, **remove** the Wi-Fi antenna from the modem.
2. **Screw in the cable** from the external Wi-Fi antenna into the modem. (Recall this is the 3m cable you routed through the EMT conduit.)



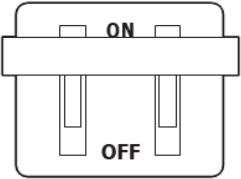
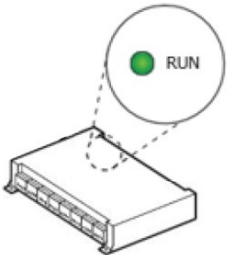
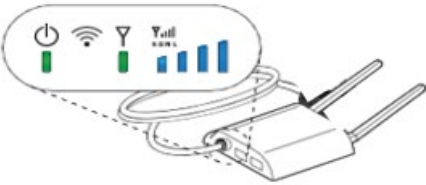

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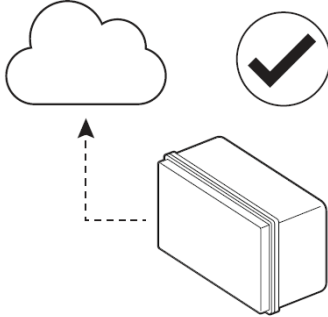
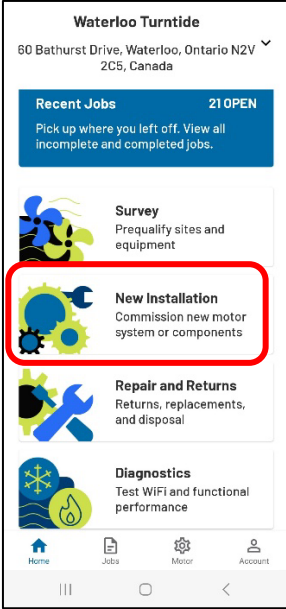
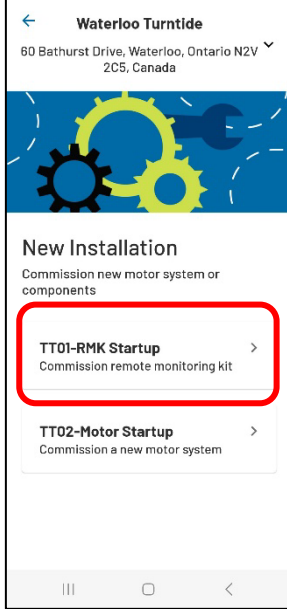
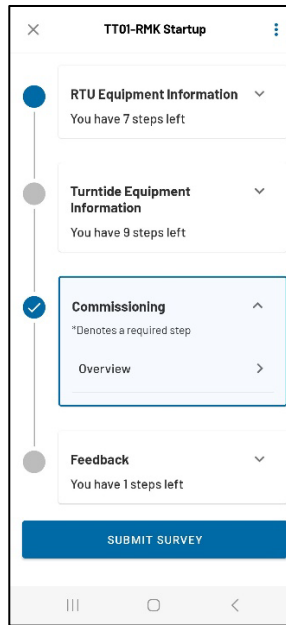
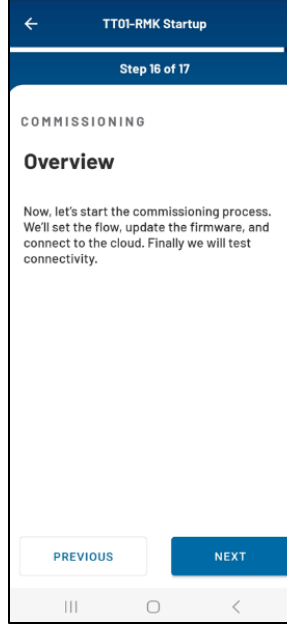
Your central RTU should now have two antenna risers.

- One antenna cable is connected through the RTU to a Turntide Motor Controller.
- The other antenna cable is connected to the RMK modem.



Task 5: Start up the system

1	Turn ON the power unit.	
2	Verify that the Turntide Supervisor has power and is running by checking the green RUN LED.	
3	<p>Verify the LED on the modem is on:</p> <p>Green LED = Power and Connection to cell Blue LED = Cell strength</p> <p>Open and close the SIM card door on the modem to ensure it is properly closed. <i>An ajar SIM card door is the most common cause of an RMK not communicating.</i> For a video demonstration, see RMK Commissioning.</p> <p>See also: Signal Strength in the Appendix.</p>	 

<p>4</p>	<p>Contact Turntide (877-776-8470) to confirm the RMK is operating and posting data to the Cloud.</p>	
<p>5</p>	<p>After physical installation is finished, use the Turntide Technician App to connect the RMK to a nearby active Turntide Smart Motor System.</p> <p>The Turntide Technician App captures information about the RTU and Turntide equipment.</p> <p>Follow the Commissioning steps which guide you through setting up the flow, updating the firmware, and connecting to the cloud.</p> <p>You can download the Turntide Technician App User Guide from the Technical Documents page on Turntide Academy.</p>	   

Wiring

Wiring Diagram

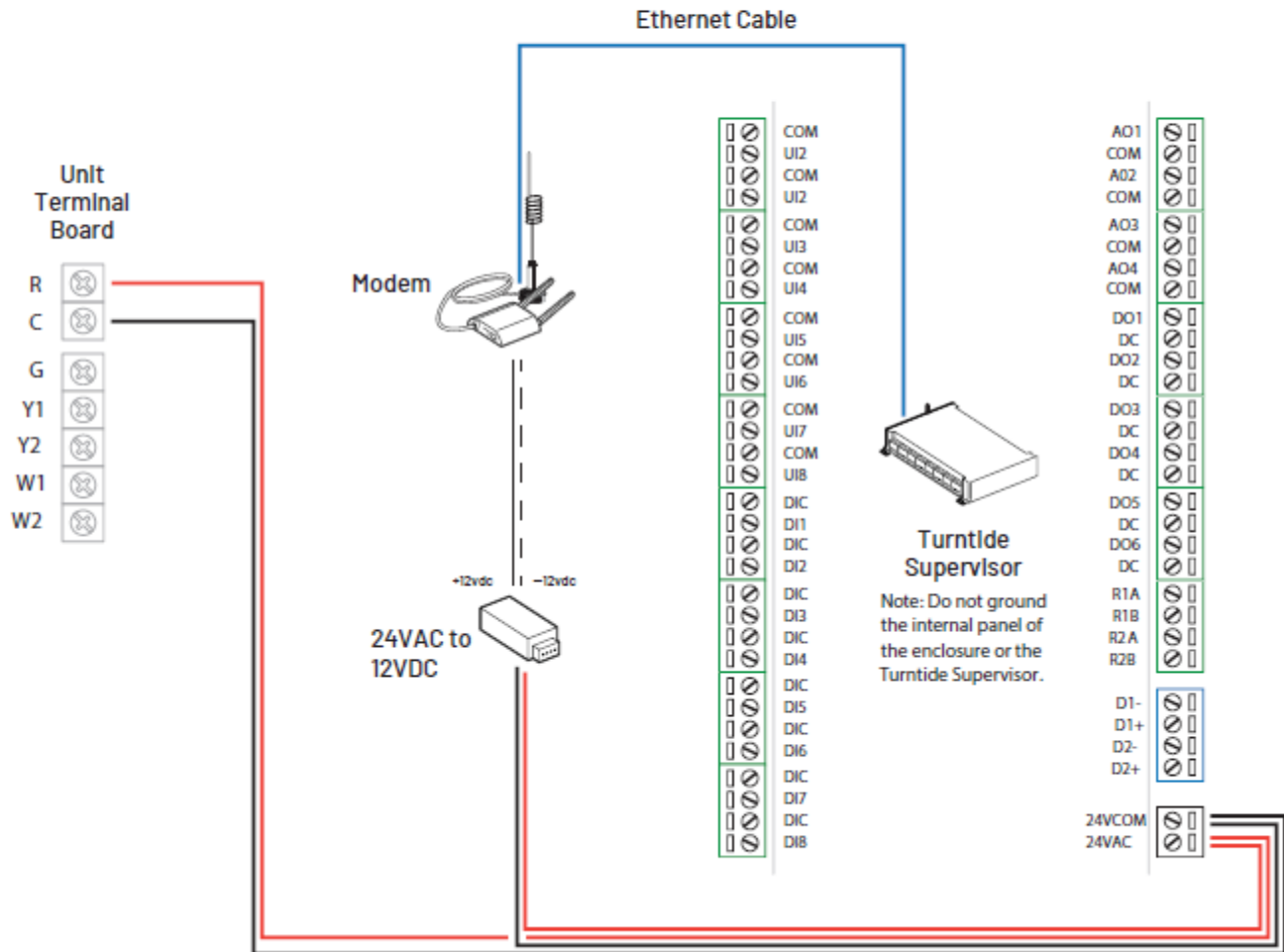
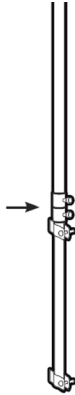

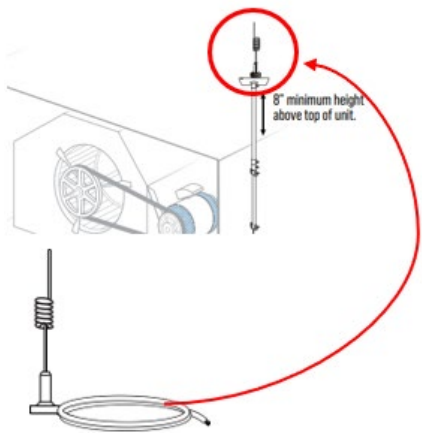

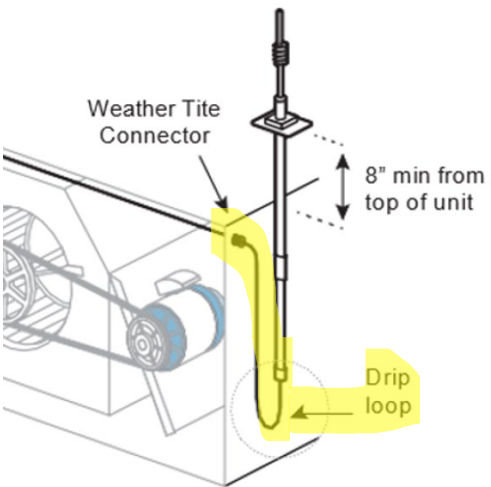
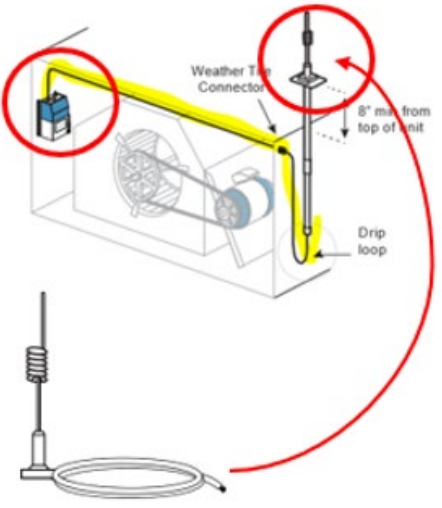


Figure 2 Wiring RMK 002

Appendix

How to install the external Wi-Fi antenna with 3m cable on each RTU that is using a Turntide Motor System (Motor and Controller)

<p>1</p>	<p>Connect the two EMT conduit sections using the EMT coupling.</p> <p>The Turntide Academy video at this URL point https://youtu.be/nTHIVFat8Bw?t=72 provides instructions for assembling the couplings.</p>	
<p>2</p>	<p>Attach the assembled antenna riser (EMT conduit) to a non-removable panel of the HVAC unit using the two conduit hangers and sheet metal screws. The EMT conduit should be screwed/bolted to the side of the HVAC unit (rooftop unit).</p>	
<p>3</p>	<ol style="list-style-type: none"> 1. Install the external Wi-Fi antenna with 3m cable on top of the antenna riser base. 2. Route the 3mm cable through the EMT conduit. 	

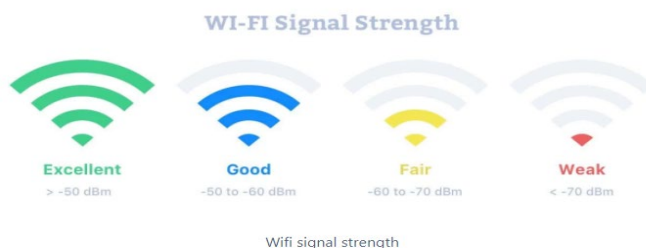
4	<p>Drill a 7/8" hole into the side of the RTU and install the Weather-Tite Connector.</p>	
5	<ol style="list-style-type: none"> 1. Route the antenna coax cable through the Weather-Tite Connector. 2. Tighten the connector over the coax only enough to grip the coax. Do not overtighten. 3. Fill the connector with silicone caulk. 4. Ensure you have a drip loop between the cable from the EMT conduit and the connection into the RTU. 	
6	<ol style="list-style-type: none"> 1. Route the antenna coax cable through the RTU. 2. Note that you must first remove the small pre-installed antenna on the P06 and SL121 motor controllers. 3. Screw the 3m antenna cable into the Turntide motor controller. 	



Signal Strength

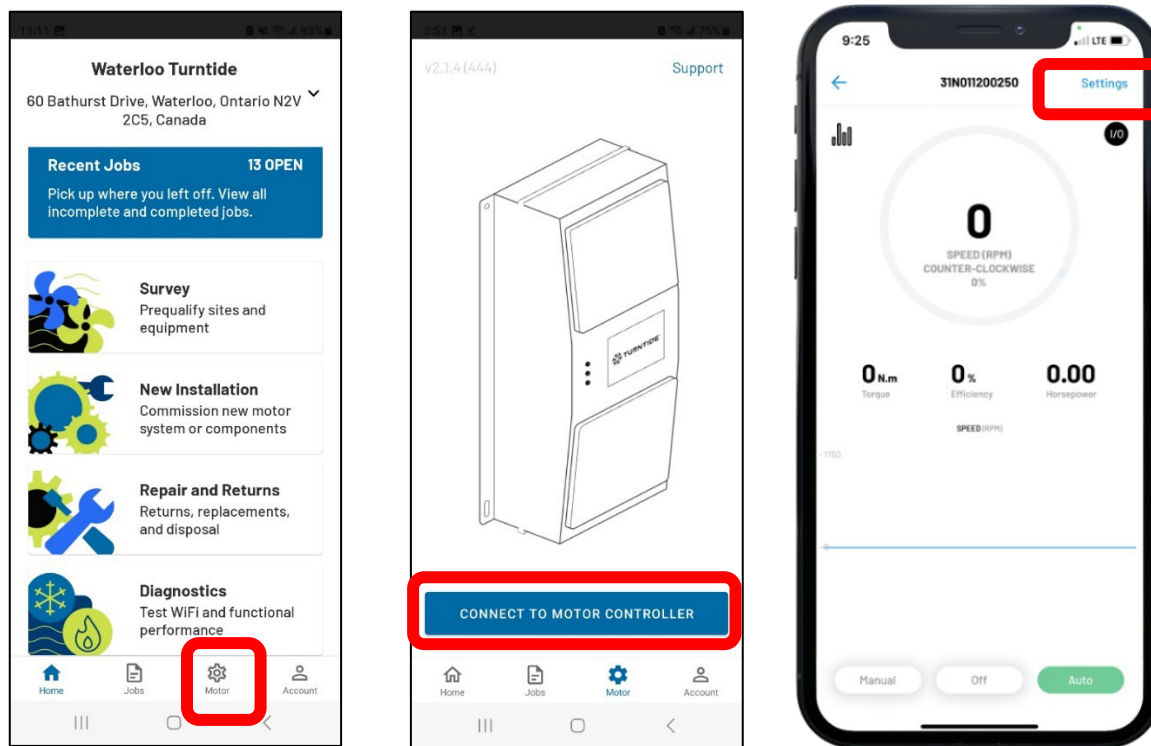
A received signal strength indicator (RSSI) is a measurement of how well your device hears a signal from an access point or router.

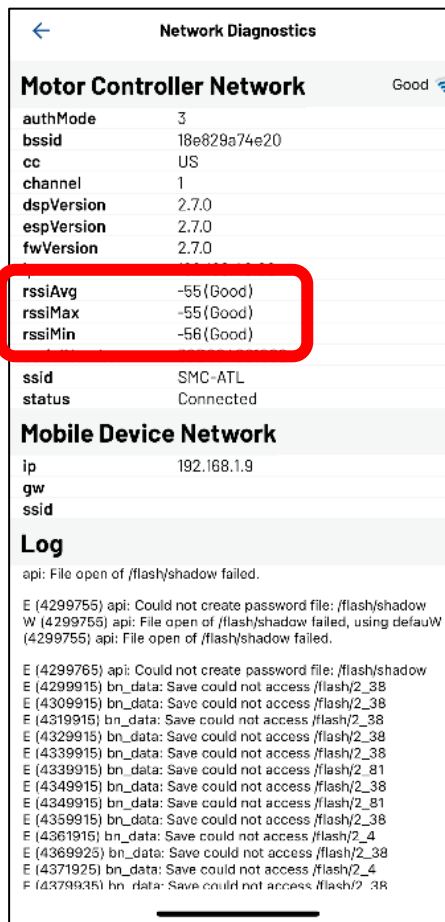
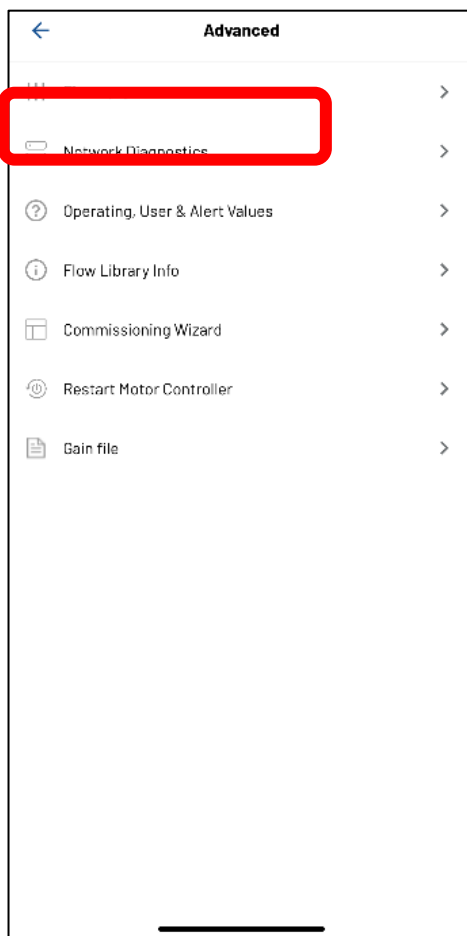
A poor signal strength indicates a problem either with the hardware supporting the connection (e.g., the motor controller or RMK antenna) or that the two devices are too far apart. **RSSI should be greater than -70 dBm** (smaller negative number).



You can view **RSSI signal strength** between a motor controller and the RMK it is connected to by using your **Turntide Technician App**.

1. Tap the **Motor** icon at the bottom of the screen in the new app.
2. The Connect to Motor Controller screen appears. You are now in the older app and may use instructions on the following pages.
3. Tap **Settings** and then tap **Advanced Settings**.
4. Tap **Network diagnostics**. The Average, Maximum and Minimum RSSI values are displayed.





Note: Turntide Technical Services can remotely determine if you have weak signal strength between a motor controller and an RMK on a roof, and then provide you with the next steps to take.

TURNTIDE TECHNOLOGY FOR SUSTAINABLE OPERATIONS

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