# *Accu-Gold Nugget Wi-Fi Module*

(For use with Accu-Gold Digitizers)

Radcal

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Radcal Part # MNL/AGNUGGET
4094277 Rev:C2
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# Introduction

Thank you for choosing the AGNUGGET, the Accu-Gold Wi-Fi Module.

For more in-depth information or troubleshooting, contact Customer Support at (626) 357-7921 x 123 or email Cust_Sup@Radcal.com

# Overview

The Accu-Gold Nugget provides a wireless connection between the Accu-Gold measurement system and the display device or computer. It contains a micro computer that relays information via Wi-Fi to the desktop or tablet running the Accu-Gold software. It uses a built-in Lithium-ion polymer battery with battery management circuitry that maintains the life of the battery by carefully controlling the charging while monitoring its temperature and voltage.

# Package contents

| | Radcal Part Number |
|---|---|
| Accu-Gold Nugget | MDL/AGNUGGET |
| Charger (5V, 1.8A) PRS/PSAC09R-050 | PRS/PSA10F-050 |
| AC power supply blades (US) or | (built in) |
| AC power supply blades (international kit) | PRS/PSA10F-Q(D) |
| Flash drive with the latest Accu-Gold software | MDL/AG2SW |
| *Flash Drive adapter, USB A female to mini USB B female* | *CBL/USB-AF2MBF* |

# System Requirements

Operating system - Windows 7, 8, 10
(Windows XP not supported)

Accu-Gold V2 or greater software required
(Version 1 is not supported).

(Note: Accu-Gold Excel and Accu-Gold Excel Templates are not supported)


| Power Switch Status | Meaning |
|---|---|
| Solid Green | Power On |
| Blinking Green | Low Battery (~25% remaining) |
| Blinking Yellow | Battery Charging |
| Solid Yellow | Battery Fully Charged |
| Long on-off pause (4 sec) | Battery Error |

| Wi-Fi Status | Meaning |
|---|---|
| Orange | Starting |
| Blinking Green | Wi-Fi Ready |
| Red | Error |

Additional indications:
Fast blinking orange is used to indicate firmware update has been completed.

# Operation

This manual does not cover software and device driver installation. For information on installing the software and driver, see the readme file located on the flash drive included with your Accu-Gold device.

Install Accu-Gold software version 2.

Snap the Nugget onto the digitizer module:

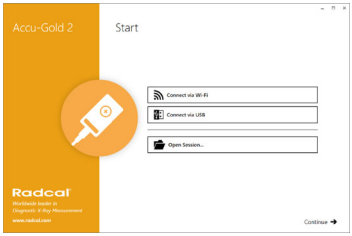

Align the USB connectors and slide the Nugget all the way in. (To remove it, pull out the connector first then unsnap it by tilting it upward or sliding it off the end of the digitizer.)

Plug in a multi-sensor, ion chamber or dose diode.

Press the power button on the Nugget. The power button will turn green. (If the charger is plugged in, it will blink yellow.) The Wi-Fi status light will turn on displaying green and then orange. When it blinks green, it is ready to connect.

Start the Accu-Gold 2 software.

Click on **Connect via Wi-Fi**. The software will detect the presence of the Nugget and connect to it automatically.




You are now ready to start.

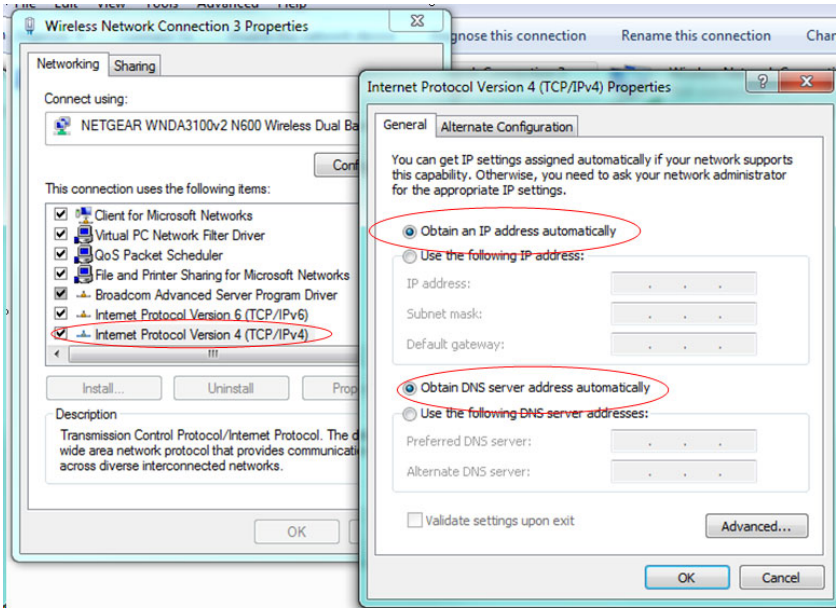
## Connecting manually

If the Nugget is not able to connect automatically, you will need to connect manually. If there are multiple Nuggets that show up, you will also have to connect manually.


For Windows 10, if you get this dialog box, click on "Connect using a security key instead"


On the computer, check the Wireless Network Connection pane.

There, you will find "Nugget_51-xxxx" as one of the Wi-Fi devices (the ID number will be the Nugget_serial number). Click on the Nugget and when asked for the **password**, enter **12345678**.




NOTE: Internet Protocol Version 4 (IPv4) must not be set to a fixed IP address. IPv4 must be set to “Obtain an IP address automatically” and “Obtain DNS server address automatically. Contact us if any issues arise.

Start the Accu-Gold 2 software.

Click on “Connect via Wi-Fi”.
You are now ready to start.

Note that not all sensors, measurements and modes of the Accu-Gold software are available when using the Nugget. See Appendix A for a comparison list.

## Battery

3.7V Li-ion polymer 1150mAh single cell - not removable. Battery life will depend on how it is being used. Turn off the unit when it is not being used to conserve battery life. Turning the unit back on will require the unit to re-establish the Wi-Fi connection which may take a minute or so at most. The Nugget will turn itself off to conserve battery life.

## Power Saving features

The Nugget will go into sleep mode as much as possible. After a longer idle time, the Nugget will go into a lower power mode. After 10 minutes, if left unattended, the Nugget will power off.

## Battery Charger

The battery management circuitry prevents over-charging and over-usage. When the battery level drops to approximately 25%, the power LED will start to blink green.

The charger that is supplied with the Nugget has been chosen to optimize the charging of the battery. The power-status light shows yellow when the charger is plugged in. Blinking yellow means that it is charging, solid yellow means that the charging is complete. The Nugget can be used while being charged and the charger may be left connected indefinitely. Typical charging time for a fully drained battery is approximately 3 hours.

If the battery has been exhausted, there will be a small delay while it charges up enough to operate.

The Nugget can be charged using other chargers or even using the USB port of a computer but the charging time may vary depending on the source and how it is recognized.

Note: firmware updates will be provided from time to time. In order to install an update, the charger supplied with the Nugget **WILL** be required.

# Physical description

| | |
|---|---|
| Dimensions | 135 mm x 62 mm x 33 mm<br>(5.3" x 2.4" x 1.3") |
| Weight | 0.12 kg<br>(0.25 lbs) |

# Environmental Conditions

Operating temperature:
15 °C to 35 °C
Pressure:
60 to105 kPa
Humidity:
Up to 80% RH or 20 g/$m^3$
Storage Temperature:
-20 °C to +60 °C

# Wi-Fi specs

Network Standard Support: IEEE 802.11b/g/n
Frequency band: 2.400 - 2.472 Ghz, channels 1-11
Antenna power: <10 mW/MHz
Connectivity: Access Point mode
Wireless Security: WPA2
Networking protocol: TCP

NOTE:

This equipment shares a frequency band with a wide range of equipment: e.g. industrial, scientific, and medical equipment such as microwave ovens, premises radio stations (radio stations requiring licenses), and specified low-power radio stations (radio stations not requiring licenses), for RFID used for factory production lines as well as amateur radio stations (radio stations requiring licenses).

1. Before use, confirm that no premises radio stations and specified low-power radio stations for RFID or amateur radio stations operate in your vicinity.
2. In the event that this equipment causes harmful interference to any premises radio station for RFID, immediately halt radio wave emission and contact Customer Support for consultation on interference avoidance measures (e.g. partition installation).
3. Contact Customer Support if this equipment causes harmful interference to any specified low-power radio stations for RFID or amateur radio stations or if other problems arise.

# Appendix A

**Measurement Feature Comparison**

Document Version 4 (2015-08-03)

Using Accu-Gold V2 software

| Feature | USB | Nugget |
|---|---|---|
| Support for AGDM | yes | yes |
| Support for AGDM+ | yes | yes |
| 10 kHz Signal Sampling | yes | yes |
| Support for AGMS-D Sensor | yes | yes |
| Support for AGMS-M Sensor | yes | yes |
| Support for AGMS-DM+ Sensor | yes | yes |
| Support for AGMS-D+ Sensor | yes | yes |
| Support for AGMS-M+ Sensor | yes | yes |
| Support for Ion Chambers | yes | yes |
| Support for Dose Diodes | yes | yes |
| Support for Light Sensor | yes | yes |
| Support for Current Clamp | yes | yes |
| Support for Current Sensor | yes | yes |
| Setting for End of Exposure Delay | yes | yes |
| Setting for Trigger Level | yes | yes |
| Setting for AGMS Calibration | yes | yes |
| Setting for IC Wave Mode | yes | yes |
| AGMS Corrections for Dose, HVL and kV | yes | yes |
| Ion Chamber Stabilization | yes | yes |
| Max Exposure Length | 300 sec | 40 sec |
| PrePulse Detection Mode | yes | yes |
| FreeRun Mode | yes | yes |
| TimeStamp for Measurement | yes | yes |
| Dose, Dose Rate, Time Results for AGMS, IC and DD | yes | yes |
| AGMS Ave kV, HVL, Filtration | yes | yes |
| Error Handling and Messages | yes | yes |
| Records all Sensor Serials | yes | yes |
| Support for Wave Bandwidth Filtering | yes | yes |
| Support for Region of Interest | yes | yes |

| | | |
|---|---|---|
| Handling of legacy IC chambers | yes | yes |
| AGMS kVp Result | yes | yes |
| AGMS PPV Result | yes | yes |
| Max Sensor Rate Results | yes | yes |
| Min Sensor Rate Results | yes | not planned |
| Duty Cycle Results | yes | yes |
| Pulse Frequency | yes | yes |
| Ave Pulse Width Result | yes | yes |
| Max Pulse Width Result | yes | not planned |
| Min Pulse Width Result | yes | not planned |
| Dose / Pulse Result | yes | yes |
| Pulse Count | yes | yes |
| IC Temperature Result | yes | yes |
| IC Air Pressure Result | yes | yes |
| Reads temp and pressure on start | yes | yes |
| Updates calibrations, temp and pressure for each measurement | future | yes |
| Dose Ratios Results | yes | yes |
| Report dose without kV | yes | yes |

| **Sensor availability comparison** | **AG V2 with USB** | **AG V2 with Nugget** |
|---|---|---|
| AGMS multisensor | yes | yes |
| AGMS+ multisensor | yes | yes |
| Ion Chamber | yes | yes |
| Dose Diode | yes | yes |
| mAs sensor | yes | yes |
| Light Sensor | yes | yes |

# Appendix B

## Firmware update

Turn off the Nugget.
NOTE: If the battery is exhausted, charge it for at least ten minutes before attempting a firmware update.

Required Equipment: **DO NOT SUBSTITUTE!**

PRS/PSAC09R-050 CHARGER, 5VDC, 1.8A USB MICRO
CBL/USB-AF2MBF ADAPTER, USB A FEM TO MINI B FEM
Flash drive with new Nugget firmware

Assemble as shown:

Flip it over and observe the WiFi light.


Press the power-on button of the Nugget. The Wi-Fi light will come on GRN then ORN. When it starts blinking orange quickly, the update is complete. Unplug the flash drive, press the Nugget power button to turn it off and then back on again. It is now ready to use.

# Appendix C

# Warranties and Disclosures

## Warranty for the Accu-Gold Measurement System

Radcal warrants that, in the event that any defects in material or workmanship should develop within one year of the date of shipment, the company assumes full responsibility for servicing equipment of its manufacture without charge upon return of the equipment to Radcal, with shipping costs prepaid by the customer. Costs to return-ship to customer by ground transportation will be paid by Radcal if the repairs are warranty-applicable. This warranty excludes batteries.

Radcal shall not be held liable for damages or delays caused by defects beyond making repairs or furnishing replacement parts, nor shall Radcal be liable for any defective material replaced without Radcal's consent during the period of this warranty. Radcal reserves the right to perform warranty services at its own factory.

## Non-Warranty Repairs

The calibration of this instrument was correct within specified limits when the instrument left our factory. Radcal cannot be responsible for injury or damage resulting from improper use or calibration errors which develop subsequent to our shipment of the instrument. If Radcal determines that a fault has been caused by misuse, abnormal operating conditions, or repairs by unauthorized personnel during the warranty period, repairs and shipping costs will be billed at normal rates.

If the equipment is found to be in proper working condition, Radcal will return-ship the equipment at customer expense.

## Data Loss
Although we take great effort to save your data, the customer is responsible for backing up any and all data that is stored on their computers prior to being serviced.

## WEEE and RoHS
Radcal meets the requirements of the Directive 2012/19/EU on Waste Electrical and Electronic Equipment, and has implemented full compliance. Recycling manuals are available on request.

The Accu-Gold Nugget meets the requirements of the 2011/65/EU (RoHS) Directive.

# Appendix D

**Declaration of Conformity**
*According to Test Report No. 97339-4 and 97339-5*

**Manufacturer's Name:** Radcal Corporation
**Manufacturer's Address:** 426 West Duarte Road
Monrovia, CA 91016
U.S.A.

**Declares that the Product**
**Product Name:** Accu-Gold Wi-Fi Module
**Model Number(s):** AGNUGGET
**Product Accessories:** All

**Conforms to the following Product Specification:**
**EMC:** EN61326-1 (2006) Group 1 Class A
EN 61000-4-2 (1995) +A1 +A2
EN 61000-4-3 (2002)
EN 61000-4-4 (2004)
EN 61000-4-6 (2009)

The product herewith complies with the RFI-emissions[1] requirements and immunity requirements and carries the CE marking accordingly.

E. MacIntosh
Engineering
10 Aug 2015

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1 This product is known to cause interference when used with the charger connected and powered. If interference occurs in a particular installation the user is encouraged to try to correct the interference by one or more of the following measures:
• Reorient or relocate the instrument.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Use it without the charger.

# Appendix E

# Regulatory

EU (ETSI):

This device is intended for home and office use in all EU countries (and other countries following the EU directive 1999/5/EC).

FCC:

Contains FCC ID: XF6-RSWC201

This device complies with the Part 15 of the FCC Rules.

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to 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 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.

FCC RF Radiation Exposure Statement:

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter. To comply

with FCC RF exposure compliance requirements, this grant is applicable to only Mobile Configurations. The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada Statement:

Contains: IC: 8407A-RSWC201

This device complies with RSS-210 of the Industry Canada Rules.

Japan (Telec)

Contains: Telec Construction Certification Number 001-A13582.


The Wi-Fi module used by the Nugget has been certified for use in Japan.

(1) “2.4”: Represents radio equipment using the 2.4 GHz band.
(2) “DS/OF”: Represents modulation system (refer to Section 2.4.1 for details[2]).
(3) “4”: Represents estimated interference-causing radius to premises radio stations for RFID (refer to Section 2.4.2 for details[1]).
(4) “▬▬▬”: Indicates that the equipment can use the entire band and is capable of avoiding the band used by RFID systems (refer to Section 2.4.3 for details[2]).

China PRC (CMIIT)

The equipment contains the RF modules of which Type Approval code is CMIIT ID: 2014DJ6439

2 SECOND GENERATION LOW POWER DATA COMMUNICATION SYSTEM/WIRELESS LAN SYSTEM ARIB STD-T66