Hawkiii

REVOLUTIONIZING EQUIPMENT MONITORING

User Manual

Dynamometer

A division of 4iiii Innovations Inc.

Revision 1.0.0

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Safety Notices

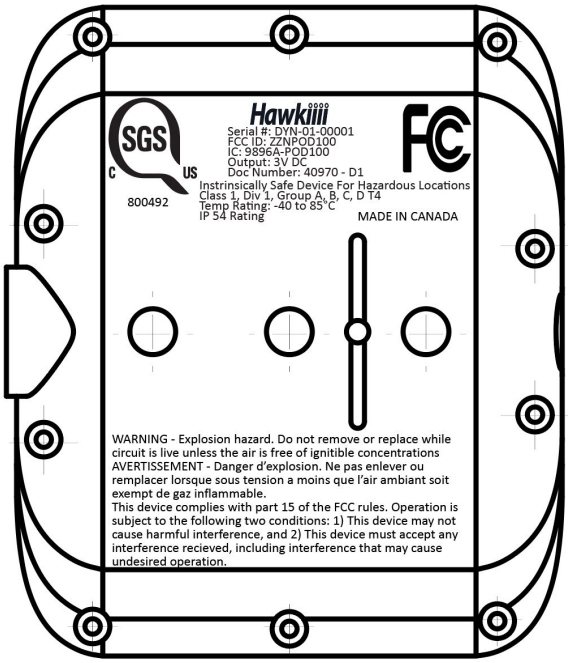
⚠ WARNING!

The Hawkiiii Wireless Dynamometer is designed to be operated in hazardous areas where flammable vapours and gases may be present.

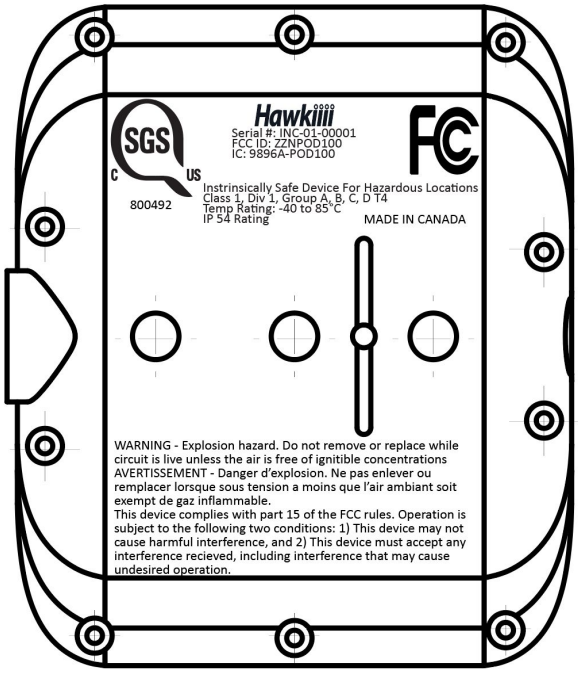
- **Never open this device in a hazardous area.**
- **Never attempt to change batteries.**
- **Never disassemble, modify, or repair this device.**
- **Clean only with a damp cloth to prevent static build up.**
- **Read this user manual before use.**
- **The Hawkiiii RTU Interface can only be connected to a Class 1 Div 2 rated device.**

Certification and Compliance

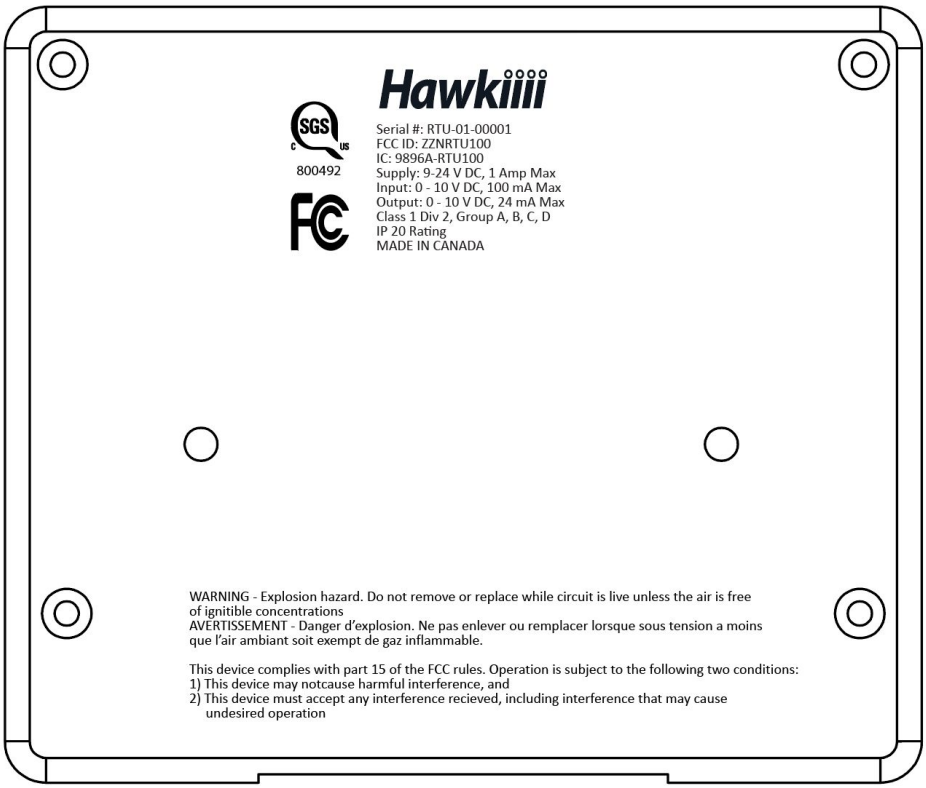
The Hawkiiii Wireless Dynamometer, Inclinometer and RTU are certified through SGS Group and Federal Communications Commission (FCC).



Dynamometer Certification and Warning Label



Inclinometer Certification and Warning Label



RTU Certification and Warning Label

FCC Part 15 regulatory statement

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.

RSS regulatory statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Safety Requirements

To comply with Intrinsic Safety requirements, the following restrictions must be observed:

- This device must only be used by Trained Personnel, and with due consideration to Intrinsic Safety requirements for use within hazardous areas.
- This device must not be modified in any way.
- Maintenance and repair must be performed by authorized Hawkiiii Technicians.
- This device must be operated only as described in Section 1.2.
- This device is supplied as a complete kit of certified Intrinsically Safe components. No components may be replaced by uncertified parts.
- Certification labels must appear on the body of the device. Labels must not be removed and must remain visible and legible.
- Certain variants of the Wireless Dynamometer are configured to interface with an RTU (POC, PLC, etc.). This RTU Interface must be installed in a Class 1 Div 2 rated enclosure while operating in a Class 1 Div 2 hazardous area.

Any violation of the above may compromise the Intrinsic Safety rating of this device.

Foreword

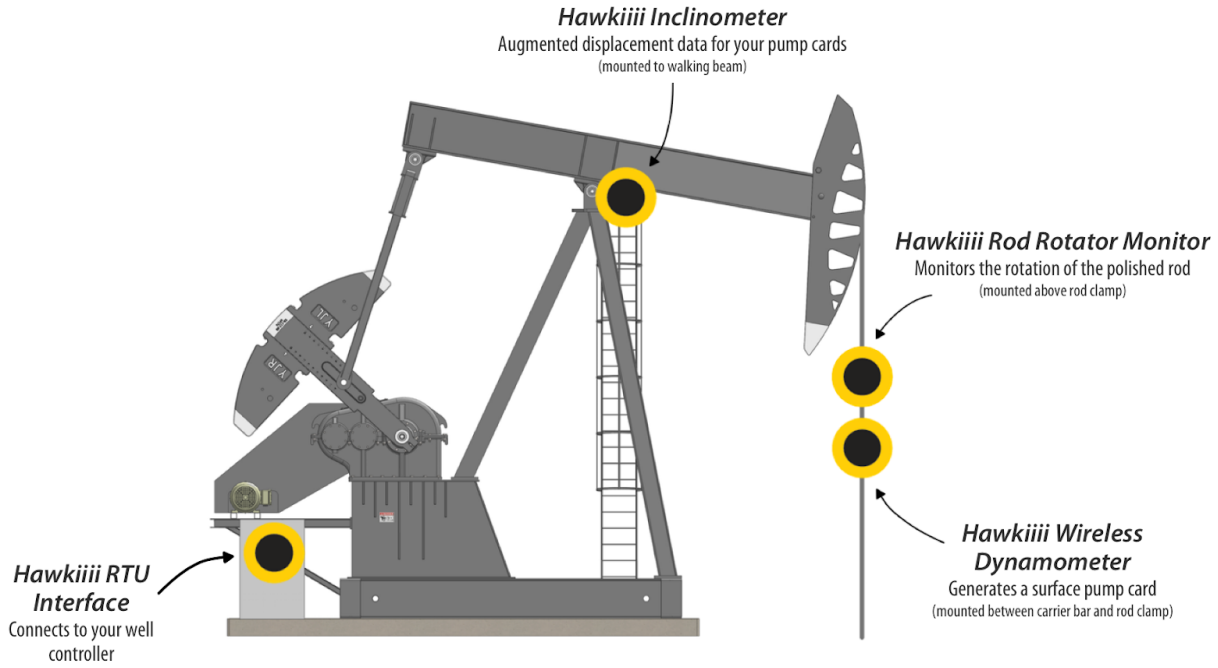
Purpose of this Manual

This manual provides information about the Hawkiiii Wireless Dynamometer, including installation instructions, operating procedures, maintenance, and to enable safe and correct use. Read this manual before installing device.

Some of the illustrations may be slightly different from your device; however, the instructions cover all models.

Wireless Sensor Solutions

Hawkiiii offers a family of wireless sensors for monitoring pumpjack performance.



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1. Devices and Parts Included

Dynamometer and Inclinometer Device

Quantity	Component
1	Dynamometer
1	Inclinometer
1	½” x 1” Bolt
1	½” Lock Nut
1	¼” x ¾” Bolt
1	¼” Lock Nut

RTU Interface

Quantity	Component
1	RTU Interface
1	Bluetooth Cable
1	Lightning Arrester
1	Bluetooth Antenna

1.2 Intended Use

This device is intended for monitoring the rotation the pumpjack polished rod under the following conditions only. Any use of this device beyond these specifications is prohibited.

- For best results, the Rod Rotation Monitor must be securely fastened to the polish rod. Please refer to installation procedure in (insert section)
- The RTU Interface must be installed according to the procedure in Section 5.3.
- The operating temperature must be between -40ºC and +85ºC.

This device is only authorized for use with one pumpjack. If the device needs to be moved to another pumpjack, please contact us at +1.403.800.3095 or support@hawkiiii.com.

2. Physical Installation

⚠ DANGER!

Explosion Hazard

Never open the device in a hazardous area.
Opening the device in a hazardous area may void Intrinsic Safety rating.

2.1 Inclinometer:

1. Magnetically attach the inclinometer to the bottom of the pumpjack walking beam. Try and attach the inclinometer as close to the saddle bearing as possible. In addition, make sure that the pod is centered between both edges of the walking beam. Lastly, ensure that the “Hawkiiii” label on the inclinometer is parallel with the edge of the walking beam.

2.2 Dynamometer:

Note: The following instructions are assuming the load cell has not been installed on the pumpjack.

1. Using the bolts provided, fasten the dynamometer to the load cell

2. Next insert 6 pin molex connector and then snuggly thread on the NPT connector

3. Lastly, securly tighten the other end of the load cell connector to that the molex connector is waterproof:

4. Even if the load cell has been installed prior to attaching the dynamometer, the above steps are still relevant

2.3 RTU Interface Installation

⚠ DANGER!

Explosion Hazard

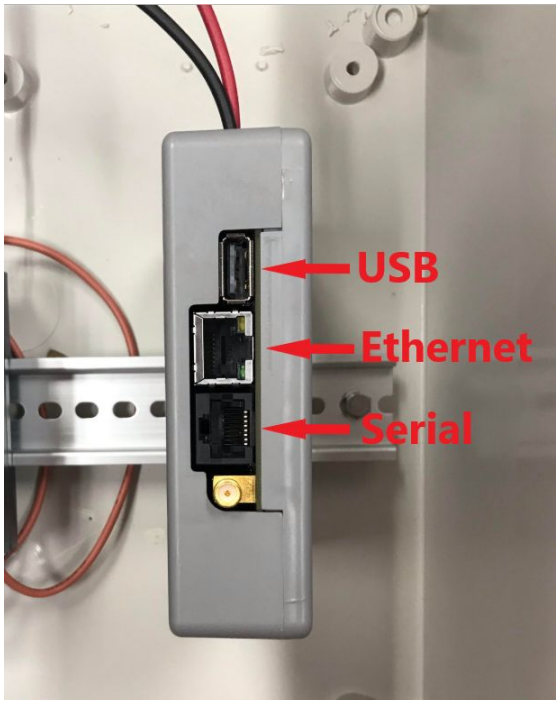
- The RTU Interface is designed to operate only within a Class 1 Div 2 IP54 or Nema 4 rated controller enclosure. Use of the RTU Interface beyond these specifications may void Intrinsic Safety rating.
- Ensure the area has been gas tested prior to opening the enclosure or working on the Hawkiiii RTU Interface.
- Never plug in the Ethernet or USB connections in a hazardous area without first gas testing.

1. Ensure power to POC has been shut off
2. Route 9 - 24 VDC power to terminals GND (negative) and + (positive), as shown below. When power has been installed, the LED on the RTU board will turn green.

3. The table below shows the various protocols supported by the RTU I/O pins

PIN	TYPE	DESCRIPTION
1	OUTPUT	4-20 MA OUTPUT A
2	POWER	4-20 MA SUPPLY
3	OUTPUT	4-20 MA OUTPUT B
4	POWER	4-20 MA GROUND
5	INPUT	CONTACT A CLOSURE DRIVE RETURN
6	INPUT	CONTACT A CLOSURE DRIVE
7	INPUT	CONTACT B CLOSURE DRIVE RETURN
8	INPUT	CONTACT B CLOSURE DRIVE
+	POWER	LOCAL SUPPLY 12 - 24 V
GND	POWER	LOCAL GROUND
11	INPUT	BRIDGE DRIVE
12	OUTPUT	BRIDGE POSITIVE
13	OUTPUT	BRIDGE NEGATIVE
14	INPUT	BRIDGE RETURN
15	INPUT	INCLINOMETER DRIVE
16	OUTPUT	INCLINOMETER OUT
17	INPUT	INCLINOMETER RETURN
18	INPUT/OUTPUT	RS485 INVERTING DATA OUTPUT / INPUT
19	INPUT/OUTPUT	RS485 NON-INVERTING DATA OUTPUT / INPUT
20	POWER	LOCAL GROUND

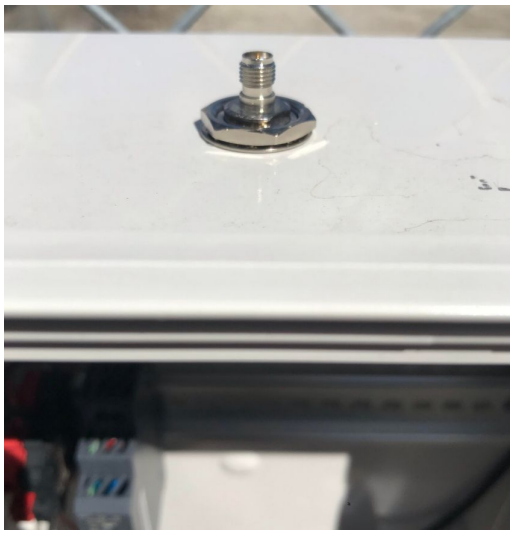
4. The RTU also supports USB, ethernet and serial



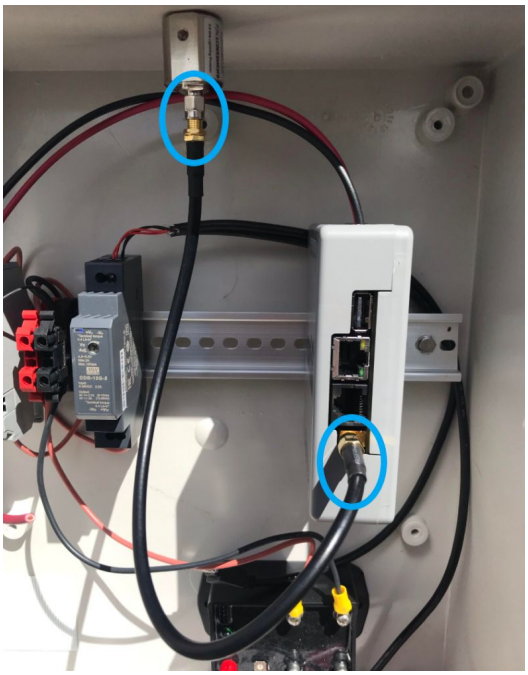
5. Serial pinout:

PIN	SIGNAL NAME	DIRECTION	DESCRIPTION
1	VCC	POWER	NOT CONNECTED
2	DCD	OUTPUT	DATA CARRIER DETECT OUT
3	DTR	OUTPUT	DAT TERMINAL READY OUT
4	GND	POWER	SYSTEM GROUND
5	RXD	INPUT	RECEIVE DATA INPUT
6	TXD	OUTPUT	TRANSMIT DATA OUTPUT
7	CTS	INPUT	CLEAR TO SEND INPUT
8	RTS	OUTPUT	REQUEST TO SEND OUTPUT

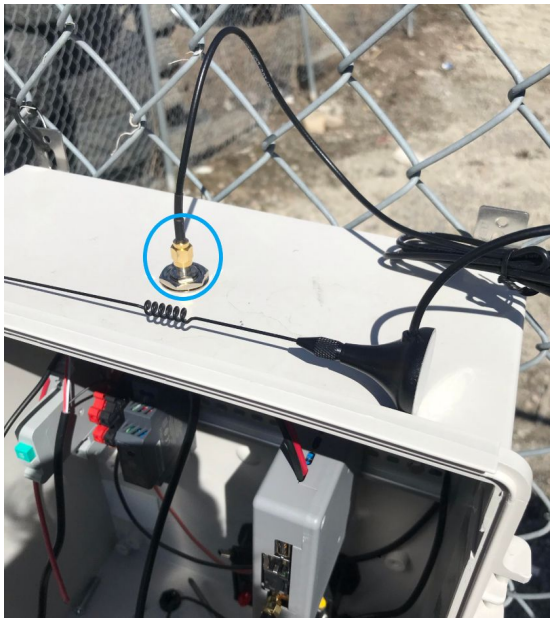
6. Drill an 11/16” into the RTU enclosure, insert the male end of the lightning arrester into the drilled out hole and securely tighten the ring nut.



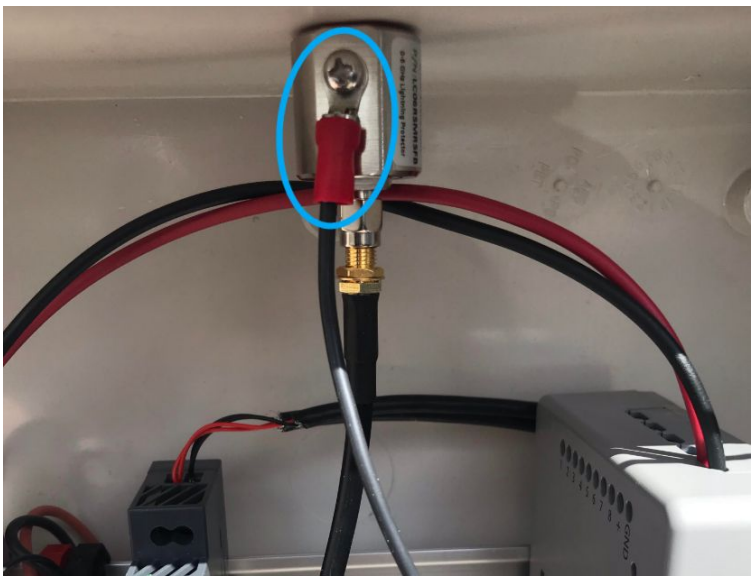
7. Thread the male end of the bluetooth cable into the female end of the lightning arrester and fasten the female end of the cable to male end of the RTU (outlined in light blue)



8. Thread the antenna connector on the male end of the lightning arrester



9. Ensure that a ground cable gets crimped to the ring connector and then screwed into the lightning arrester



2.4 Connecting Dynamometer and Inclinometer to RTU

1. The Dynamometer and Inclinometer are paired to the RTU before shipment and are designed to automatically connect as soon as the RTU is powered on.

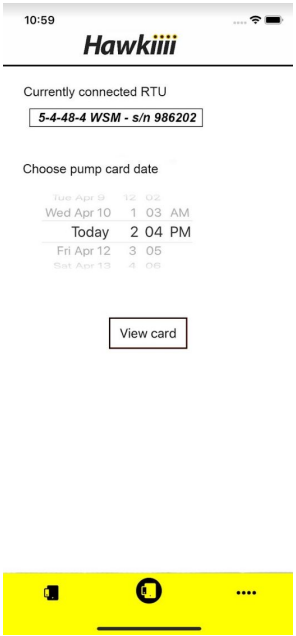
2. The connection process should take approximately 30 seconds

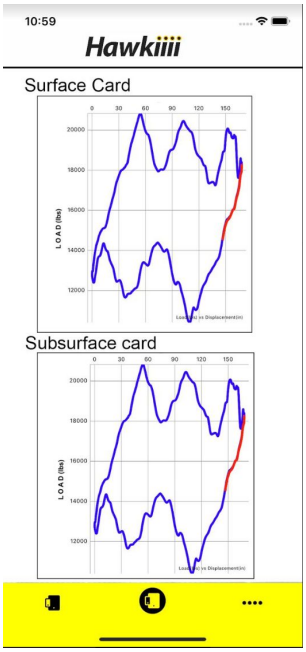
3. Accessing Data on RTU Using the Hawkiiii Phone App

Pump cards can be easily accessed over an authenticated wifi connection using the Hawkiiii phone app as long as the operator is at around 30 ft away from the RTU:

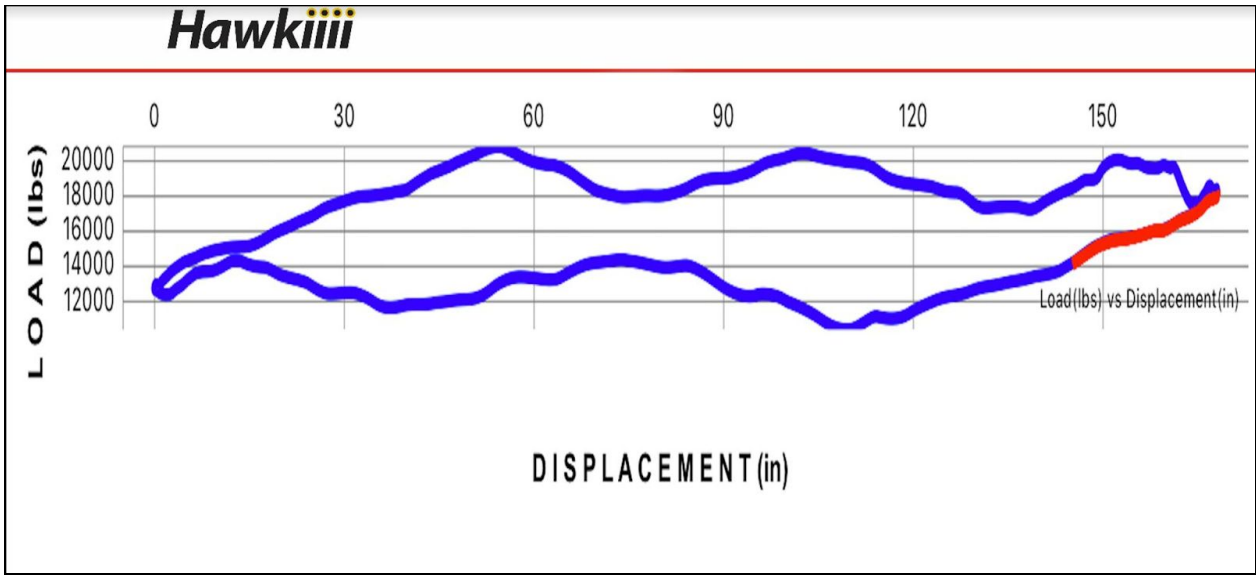
1. First go to “Settings” and then open “Wifi”. Next connect to the correct RTU as shown

2. Once the app has connected to the RTU over wifi, it will be possible to view pump cards for whichever date and time are desired:





3. For greater pumpcard resolution, flip the phone horizontally



4. Maintenance and Care

⚠ DANGER!

Explosion Hazard

Only clean with a damp cloth to avoid risk of static discharge in a hazardous area.

Your Hawkiiii device should be cared for properly. Follow these guidelines:

- Store your device between temperatures of -40ºC to +85ºC.
- Clean with a damp cloth using only water or mild soap.
- Do not immerse the device in liquid.

5. Battery Replacement

⚠ DANGER!

Explosion Hazard

Never attempt to change batteries in a hazardous area.
Unauthorized replacement of batteries will void Intrinsic Safety rating.

To comply with Intrinsic Safety requirements, battery replacement must only be performed by an authorized Hawkiiii Technician.

1. Remove the Hawkiiii device from the pumpjack. **WARNING: Do not open the Hawkiiii device in a hazardous area.**
2. Mail the Hawkiiii device to the following address. **Specify the return address on the package.**

   Hawkiiii
   4iiii Innovations Inc.
   141-2 Ave E
   Cochrane, Alberta T4C 2B9
   Canada

3. Hawkiiii will replace the batteries (based on the terms and conditions of the original purchase agreement) and return them to you at the return address specified on the package.

6. Servicing and Repair

To comply with Intrinsic Safety requirements, Servicing and Repair must only be performed by an authorized Hawkiiii Technician. For technical support, please contact us at +1.403.800.3095 or support@hawkiiii.com.

7. Contact

Hawkiiii is leveraging 4iiii Innovations Inc. expertise in wireless technology, strain and motion measurement to develop easy to install, lightweight, wireless sensor solutions for monitoring industrial equipment. Industrial companies can use these sensors to increase production, reduce operating costs, optimize performance, forecast maintenance, predict and prevent failures, and improve bottom line.

Please contact us for more information.

Phone: +1.403.800.3095	**Mailing Address:**
Email: support@hawkiiii.com	**Hawkiiii** 4iiii Innovations Inc. 141-2 Ave E Cochrane, Alberta T4C 2B9 Canada
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