

CORNELL PUMP COMPANY

IOT ECOSYSTEM

REMOTE PUMP MONITORING SYSTEM



CORNELL'S IOT ECOSYSTEM

CORNELL'S COMMITMENT TO PROGRESS



Cornell Pump Company's IoT ecosystem is a testament to our unwavering commitment to innovation and customer-centric efficiency improvements. We have seamlessly integrated cutting-edge IoT technologies into our pump systems, creating an interconnected network that redefines how our customers approach pump management. This ecosystem empowers our customers with real-time data insights, predictive maintenance capabilities, and remote monitoring, enabling them to optimize performance, reduce downtime, and maximize energy efficiency.

Our dedication to innovation aligns perfectly with Cornell's overarching goal of enhancing the operational experience for our valued customers. By embracing IoT, we have not only elevated the performance of our pump systems but also revolutionized how our customers interact with and benefit from our products. This ecosystem represents a synergistic blend of our nearly century-long expertise in pumping solutions and the ever-evolving technological landscape.

Through this strategic fusion, we continue to empower our customers with the tools to make informed decisions, minimize disruptions, and drive sustainable growth. As we navigate the dynamic challenges of various industries, our IoT ecosystem ensures that our customers remain at the forefront of efficiency, productivity, and innovation. At Cornell Pump Company, we are creating pumps and shaping the future of pumping technology for a more connected and efficient world.

CORNELL'S IOT ECOSYSTEM

Since 2018, Cornell has been at the forefront of hardware and software innovations designed to easily track, monitor, and operate rotating equipment and other assets in settings as diverse as farms, factories, oil rigs, emergency bypass, water treatment, open pit mining, marine environments, and more.

Powered by constantly evolving components, our customers provide a virtuous feedback loop to improve systems and designs to suit your needs better and increase the range and efficacy of our IoT products.

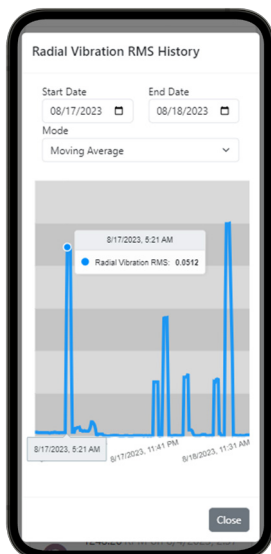
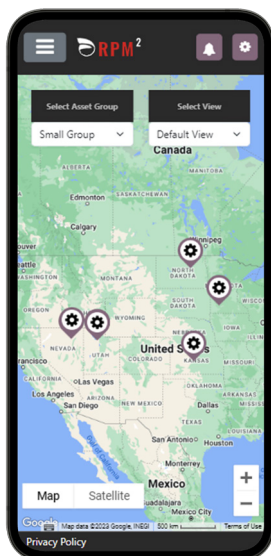
RPM2™ EQUIPMENT MANAGEMENT PLATFORM

What is RPM²

RPM² is a software platform that allows users to track, manage, locate, and perform predictive analysis on equipment with attached Internet of Things (IoT) hardware. The software enables different users' level protection so a company can assign access pertinent to roles.

It allows groupings and comparative performance between and among groups and individual equipment, can alert if the equipment is out of condition or moved beyond a specified location, and keeps documentation, such as O&M manuals, operating curves, etc., centralized.

The software also offers a service log for each piece of equipment, allowing users to track the time and details of maintenance.



OPERATIONS

- Run Time
- Engine or motor condition
- Vibration and bearing temperature
- User defined alert conditions: available via email, SMS, or phone call, with timed escalations
- Flow rate
- GPS Location
- Alert if equipment moved beyond a determined area (GeoFencing)
- Asset recovery if stolen
- Location history

CONTROL

- Start and Stop Machinery
- Control Operating Speed
- Configure Automated Operating Parameters

ANALYSIS

- Comparative analysis of individual assets over time (usage, efficiency, etc.) and comparison across a fleet
- Leads to better business intelligence and decision-making

PREDICTIVE MAINTENANCE

- Establish baseline operation for equipment
- Leads to suggestions on when materials may need to be replaced:
 - Grease or oil in the bearing frame, based on run time
 - Engine lubrication/service
 - Seals, Impellers, and other wear parts, based on performance
 - Flags equipment that is out acting outside of "normal."

CORNELL CO-PILOT™



Connect via Cell



5 Sensor Inputs



Remote Control



CORNELL Co·Pilot™

THE POWER OF IOT

Cornell Co-Pilot is a monitoring system that connects to your pump to track temperature, vibration, and location. Co-Pilot can also be powered with a wired connection for continuous monitoring and control system integration. Our Internet of Things (IoT) platform and reflects our dedication to cutting-edge design and meeting customer needs.

USE THE CO-PILOT TO:

- Plan maintenance
- Check operation
- Reduce manual inspections
- Track pump location
- Demonstrate run conditions to customers on warranty claims
- Improve run time through the maintenance program

MONITORING AT YOUR FINGER TIPS

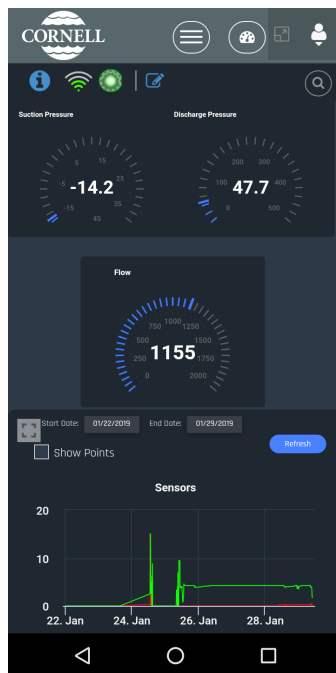
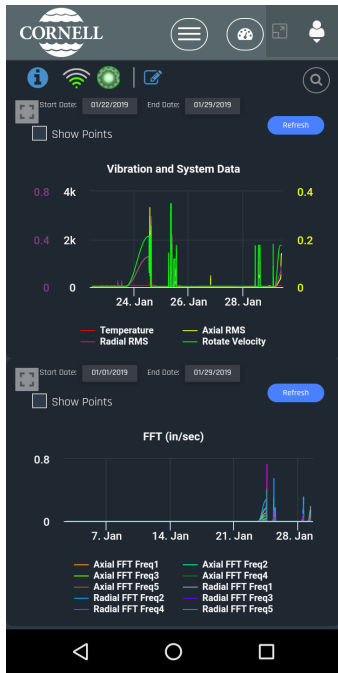
Easily monitor your pump's performance with desktop and mobile apps available for iOS and Android. Receive alarms for out-of-condition operations and view the last GPS location of the pump, all in one convenient platform.

CORNELL CO-PILOT ALLOWS YOU TO:

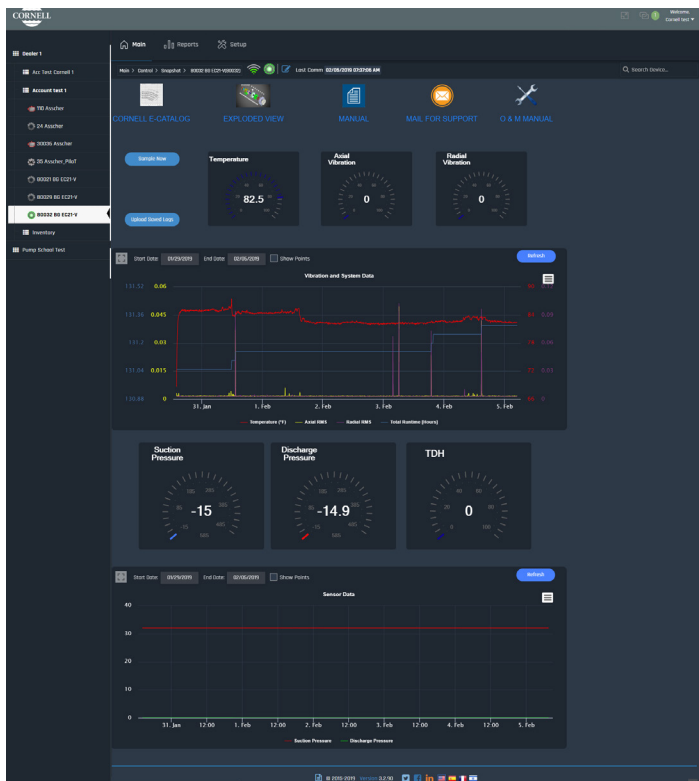
- Monitor pumps using the cloud and IOT
- Monitor temperature, vibration, and GPS location
- Additionally monitor pressure, flow, start/stop operations, and more*
- Track data over time via web-based and mobile apps
- Receive real-time pump data for performance and health monitoring
- Receive alerts for preset running conditions

*Requires external sensors; contact Cornell for details.

CO-PILOT™ SPECIFICATIONS



Screenshots from the mobile Co-Pilot app.



Co-Pilot desktop version screenshot.

TECHNICAL SPECIFICATIONS

COMMUNICATION

- 4G LTE cellular cloud connectivity
- Monitor all connected pumps from a single app
- GPS Location Information

ON -BOARD MONITORING

- 3-axis vibration monitoring [Inch/Sec]
- Temperature $\pm 5^{\circ}\text{F}$ / $\pm 2.7^{\circ}\text{C}$
- Modbus (R5-485)
- Up to 5 additional inputs to connect external sensors

NOTIFICATIONS

- Vibration threshold cross
- Temperature threshold cross
- Service Hours reached
- Pump Start/ stop
- High pressure
- And more

DIMENSIONS/ OPERATIONS/STANDARDS

- 3.4" x 3.4" x 1.9" (86mm x 86mm X 48mm)
- Robust insulated enclosure
- IP65 compliant (dust tight and protected against water from a nozzle)
- FCC Part 15 and RoHS compliant
- Temperatures from -22°F / -30°C to 158°F / 70°C

POWER

- External DC power: 12-24 VDC
- 500mA MAX
- Avg. 70mA @VDC

Get started at
CO-PILOT.CORNELLPUMP.COM

CORNELL PULSE™



Now
Installed
on Cornell
Pumps

CORNELL
 Pulse™

An innovative technology that makes monitoring your pump easier than ever.



MONITOR PUMP
HEALTH ONSITE



LOG REPORTS TO REVIEW
AND COMPARE



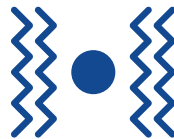
ACCESS INFORMATION VIA
AN EASY-TO-USE MOBILE APP



GAUGE BEARING FRAME
TEMPERATURE



USE ONBOARD POWER FOR UP TO
THREE YEARS FOR CONSISTENT,
ACCURATE READINGS



MEASURE PUMP VIBRATION
SEVERITY



DISTINGUISH/RENAME PUMPS
FOR GREATER CLARITY IN
MULTIPLE PUMP INSTALLATIONS

LEADING-EDGE REAL TIME SNAPSHOT

Cornell Pulse is an innovative technology that allows a user to measure a pump's vibration severity and temperature in real time. Pulse is a compact (approx. 1.5"/4CM diameter) pump-mounted wireless device that captures pump data when queried by the end user. Helpful pump measurements, such as temperature and vibration, are viewed by logging into a mobile app for phones and tablets. When coupled with our Remote Pump Maintenance and Monitoring (RPM2®) system, Pulses report data to the cloud and track pump and other rotating equipment conditions. RPM2® can also record the GPS location from where the scan took place. The detection of common pump problems is vital to increasing the lifespan of a pump and its efficiency.

As the name implies, the Pulse allows a user to check a pump's health quickly. The Pulse is a robust wash-down duty unit that can last around three years with daily measurements (more frequent measurements use battery power and reduce service life.)



CORNELL CO-PILOT™ FLOW METER

INTRODUCING NEW CO-PILOT FLOW METERS



FLOW METER	
LINEAR MATERIALS	EBONITE
METERING TYPE	MAGNETIC
ELECTRODE MATERIAL	HASTELLOY C
FLANGE RATING	ANSI 150LB
INGRESS RATING	IP68 (HEAD UNIT)
BODY CONSTRUCTION	FULLY WELDED & INTERNALLY POTTED
VOLTAGE	BATTERY or 12-24VDC
AMBIENT TEMPERATURE	-4° TO 140°F / -20 TO 60°C
FLUID TEMPERATURE	-13° TO 176°F / -25° TO 80°C
ACCURACY	0.2% of rate +/-0.08in/sec
FLOW VELOCITY RANGE	0.05ft/sec TO 32.81ft/sec
FLOW UNITS	Ft3, GAL, m, m3, L, ML
OUTPUTS	Pulse (Modbus and 4-20 mA options available on powered units)

Battery or wired configurations are available!

FEATURES OF THE METERS INCLUDE:



ROBUST AND RELIABLE
CONSTRUCTION



ACCURATE
MEASUREMENTS



SMALL PHYSICAL
FOOTPRINT



BI-DIRECTIONAL
METERING



ABILITY TO OPERATE
ON BATTERY



EXTRAORDINARY
CHEMICAL RESISTANCE



CERTIFIED IP68
PROTECTION



FULLY WELDED POTTED
BODY



ELECTRODES IN
HASTELLOY C



EASY INSTALLATION



OUTSTANDING
CO-PILOT SUPPORT
AND INTEGRATION



RPM² SEEKER: TWO VERSIONS OF SATELLITE ASSET TRACKING

Address Loss Prevention and Asset Management

As part of the RPM² suite of hardware, the Seeker Satellite asset tracker comes in either an onboard-powered version or a solar power unit. By addressing the twin concerns of asset management and loss prevention at both fixed installation and remote mobile worksites, the units offer:

- **Global Transmission:** Employing the Globalstar network, the system works worldwide.*
- **Dependable Coverage:** works for fixed and mobile assets with exceptional uptime.
- **Reliable:** Employing the RPM² platform, the system offers consistent, predictable results.
- **Rugged Build:** Able to withstand the rigors of mobile placement, the RPM² Seeker Units will perform well for many years.
- **Affordable Operation:** RPM² offers top value for service in the mobile monitoring space
- **Cost Reductions:** Saves the time and hassle of having to check on assets with remote monitoring.
- **Assurance:** Knowledge of what is happening with equipment and logging activity for better predictive maintenance.
- **Auto-Updating:** the system will receive new updates when they become available over transmission.
- **Easy Set-Up:** quick setup of the hardware and software that is intuitive yet powerful.
- **Safety:** The Seeker is ATEX certified and intrinsically safe to operate in harsh and dangerous environments.
- **Data Congruity:** Tracking multiple assets and data in one place, RPM² offers optimal management and visibility into your business operation in one simple yet powerful solution.

**Global Coverage does not include Australia and New Zealand*

SOLAR-POWERED ASSET TRACKER CERTIFIED INTRINSICALLY SAFE TO ATEX ZONE 0 AND HERO

Solar-powered and designed for demanding environments, this industrial IoT asset-tracking device is intrinsically safe and maintenance-free for tracking, monitoring, and data collection.

Seeker Solar’s integrated solar panel and battery capabilities deliver up to 10 years of life with minimal maintenance. This asset GPS tracking device easily mounts to any fixed or mobile asset for intelligent tracking, and monitoring,. Seeker Solar has unparalleled safety/device certifications such as ATEX, IECEx, and North America, IP68/69K, HERO certifications, and others to meet the needs of every application.

KEY FEATURES

- Solar-powered with up to 10 years of battery life
- Intrinsically Safe IoT asset tracking solutions
- Bluetooth interface for configuration and firmware updating
- Quick and easy installation requires no harnesses, external power, or external antennas

WIDE RANGE OF REPORTING CAPABILITIES

- Geofencing with the configurable range setting
- Low battery message
- Contact closure parameters
- Diagnostic messages

BENEFITS

- A maintenance-free device as the power of the sun recharges its batteries, providing up to 10 years of usable service
- Delivers reliable location reporting for assets deployed worldwide – providing security and improved efficiency for your business
- Easy to install as simple packaging requires no harnesses, external power, or external antennas
- Two dry contact or wetted-voltage inputs available to manage engine run time, tank level, or various alarm inputs

ADDITIONAL COMPONENTS



CO-PILOT VALVE

- Co-Pilot Integrated Remote Valve Position & Control
- Control for up to (4x) 4-20mA actuated valves in 1% increments (0-100%)
- Feedback Loop to readback valve position over 4-20mA
- Configurable for power loss conditions (full open or full closed)
- (4x) 4-20mA Analog Inputs for Pressure or other sensors
- (1x) Digital Input for connecting to a compatible flow meter
- 12-24VDC Power Required (Valves require separate power source)
- NEMA 4X Enclosure
- GPS Location
- Connectivity via Cellular Modem (Verizon or AT&T options available)

**Kit does not include valve actuators*



Image is for reference ONLY

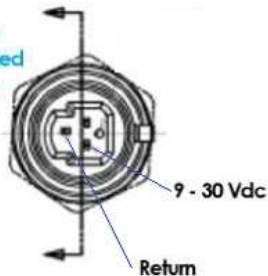
PRESSURE TRANSDUCER

Measuring pressure levels and changes through Cornell Co-Pilot, these transducers are matched explicitly for unrivaled ease of installation, longevity, and accuracy. The units in 250 and 500 psi models handle burst pressure up to 10XFS or 15,000 PSI. Operable in a wide range of temperatures and conditions, these pressure transducers relay vital information about operating conditions to the Co-Pilot, all in a compact unit.

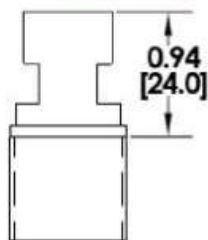
Optional diaphragm seal that increases sensor life and protects against fouling and wear.

Packard Connector Transmitter (4 to 20 mA)

Pin 1 - Power
2 - Not Used
3 - Return



Packard



ADDITIONAL COMPONENTS

SUBMERIBLE TRANSMITTER



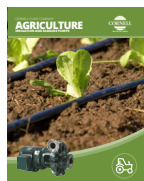
The Cornell Co-Pilot Submersible Level Transmitter is a cost-effective, fully submersible solution for all your level monitoring needs. All stainless steel construction is designed to withstand immersion for extended periods in most water, wastewater, and sewage applications. The "Steel Cage" design protects against mud, debris, sand, and rag build-up, making it an excellent choice in the most demanding level sensing applications. With the 2-pin Deutsch connector pre-installed, the transducer is plug-and-play compatible with your Co-Pilot monitoring system right out of the box.

TEMPERATURE PROBE



One option to monitor the temperature of liquid media and operating equipment is to use this small and accurate temperature probe. This probe is simple to set up and has a wide operating range of 0 to 300°F / -18 to 149°C. Additionally, it can withstand high pressures of up to 400 bar.

CORNELL PUMP COMPANY MARKET & PRODUCT LINE



AGRICULTURE



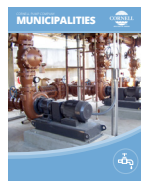
FOOD PROCESS



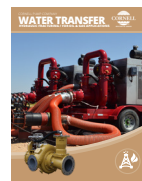
INDUSTRIAL



MINING



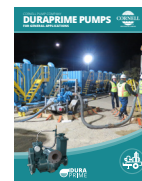
MUNICIPAL



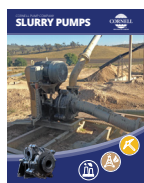
WATER
TRANSFER



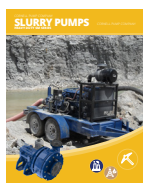
REFRIGERATION



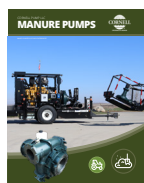
CONSTRUCTION



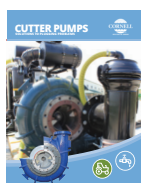
SLURRY



SLURRY SM



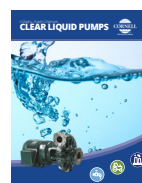
MANURE



CUTTERS



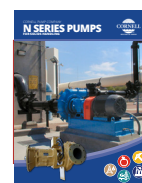
SELF PRIMING



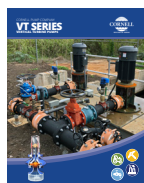
CLEAR LIQUIDS



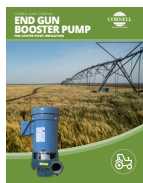
MX SERIES



N SERIES



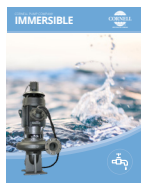
CYCLONE™



EDGE™



HYDRAULIC
SUBS



IMMERSIBLE



CD4MCU



RUN-DRY™



PRIMING
SYSTEMS



CYCLOSEAL®

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Cornell pumps and products are the subject of one or more of the following U.S.
and foreign patents:

6,074,554; 6,036,434; 6,079,958; 6,309,169; 6,104,949.

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