Manual Product

Rev 1

Tachometers

To initiate the data acquisition process, a speed signal is needed. It requires a trigger to initiate the data acquisition, converting mechanical motion into an electrical signal that is used by the system to monitor specific parameters.

The rotational speed readings play a crucial role in assessing the behavior and in order tracking analysis, which involves tracking signals relative to a specific reference point or order.

By synchronizing the data with the rotational position of a component, tachometers enable analysts to analyze data at specific points in the rotation cycle.

This allows for the identification and diagnosis of faults associated with specific components or events,

It can be done with either one of three components:

- Optical sensor
- Magnetic Pickup
- Encoder

Optical Sensor Mounted

The Optical Sensor and Magnetic Pickup give us one pulse per revolution. The Encoder provides shaft position within 1/3 degree.

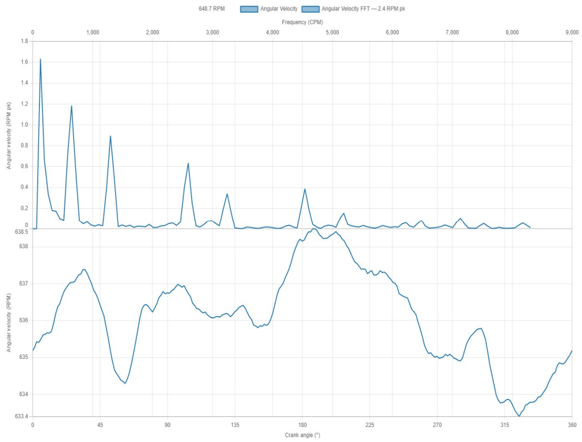
Tips

The speed signal is not needed if only collecting FFT data without TDC synchronization.

Magnetic Pickup Mounted

In conjunction with the Pulse and/or Lenz, these components provide machine shaft position information for analysis by Resonance's devices.

One of the most valuable and detailed analyses can be performed, Angular velocity, which is defined as the rate of change of angular displacement with respect to time.



Example. Angular Velocity Analysis

The Optical Sensor can be used to detect the speed of rotating machinery. An optical sensor is an electronic device that detects light and converts it into an electrical signal. The optical sensor works by detecting the presence or absence of light as a target passes by the sensor.

It requires a reflective tape to detect the speed of rotating machinery. The reflective tape is placed on the rotating machinery and acts as a target for the optical sensor. As the reflective tape passes by the optical sensor, it reflects light back to the sensor, which generates an electrical signal that is proportional to the speed of the rotating machinery.

Optical Sensor.

How to Section

This section will give information about how to use the Resonance Systems Kit with an Optical Sensor.

Components needed

QTY	Description	Part Number
1	Optical Sensor	
1	Pulse	Pulse
1	Lenz	LNZ

Hands-on

Follow the next steps:

1. There are two options to connect the Optical Sensor. Either Wireless or Non-Wireless.

a) **Wireless.** Connect the Cable end Amphenol connector of the Optical Sensor Cable, to the Pulse connector that is labeled “Encoder”.

Connecting Encoder Cable to Pulse.

b) **Non-Wireless.** Use the Lenz for this option. The LENZ has an Amphenol connector that is labeled “SYNC.” Connect the Amphenol connector end of the Optical Sensor Cable to this connector.

Connecting the Encoder Cable to Lenz.

2. Stick the reflective tape on the shaft of the machine.

Reflective Tape Mounted on Flywheel.

3. Place the Optical Sensor pointing out to the reflective tape. Make sure that the Optical Sensor is securely attached to the machine or support.

Optical Sensor Mounted.

4. Turn on the Pulse and the Lenz. Note that the Pulse and the Lenz connect to each other. Both lights must be blinking at the same rate.

Tips

The speed reading on the Rmonix will be ~ 594 rpm if no signal is detected. Otherwise, the actual rpm will be shown.

Remember that the Optical Sensor detects light. Be sure to cover it from other light sources.

Click the following link for a video showing the Optical Sensor setup, field use, and data collection using Rmonix .

Magnetic Pickup

The Magnetic Pickup can be used to detect the speed of rotating machinery. It works by using a magnet to generate a magnetic field. The magnetic field generated by a magnetic pickup can be affected by the presence of holes or pins in the rotating machinery.

When a hole or pin passes by the magnetic pickup, it causes a change in the magnetic field that is detected by the pickup. The frequency of the changes in the magnetic field is proportional to the speed of the rotating machinery. By analyzing these changes in frequency, it is possible to determine the speed of the machinery.

Magnetic Pickup

How to Section

This section will give information about how to use the Resonance Systems Kit with a magnetic pickup.

Components needed

QTY	Description	Part Number
1	Magnetic Pickup	MAG-P/U
1	Cable	MAG-P/U-CBL
1	Adapter	MAG-PU-ADPT
1	Pulse	Pulse
1	Lenz	LNZ

Hands-on

Follow the next steps:

1. Connects the Magnetic Pickup **Error! Reference source not found.** to the cable **Error! Reference source not found.**. The Amphenol 2-pin connector connects to the Magnetic Pickup.

Connecting Magnetic Pick to MagPickup Cable

2. Connects the cable end **Error! Reference source not found.** to the Adapter **Error! Reference source not found.**. The BNC female connector connects to the BNC male Adapter.

Connecting MagPickup Adapter.

Magnetic Pickup

Connecting the Encoder Cable to Lenz.

3. In this step, there are two options to connect it. Either Wireless or Non-Wireless.

c) **Wireless.** Connect the Cable end Amphenol connector of the Adapter **Error! Reference source not found.**, to the Pulse connector that is labeled “Encoder”.

Connecting Encoder Cable to Pulse.

d) **Non-Wireless.** Use the Lenz for this option. The LENZ has an Amphenol connector that is labeled “SYNC.” Connect the Amphenol connector end of the MAG-PU-ADPT to this connector.

4. Turn on the Pulse and the Lenz. Note that the Pulse and the Lenz connect to each other. Both lights must be blinking at the same rate.

Tips

The speed reading on the Rmonix will be ~ 594 rpm if no signal is detected. Otherwise, the actual rpm will be shown.

Remember that the Optical Sensor detects light. Be sure to cover it from other light sources.

Click the following link for a video showing the Mag Pickup set-up, field use, and data collection using Rmonix

Encoder

The Encoder can be used to detect the speed of rotating machinery. A rotary encoder measures rotation using two internal switches very close together and a rotating disk. The disk has holes in it, and when it passes each switch, the switch opens and then closes.

The switches open and close out of phase with each other, and the resulting pattern of open and close lets you detect the rotation. The encoder transforms the rotational motion or position of a shaft into electrical impulses through an optical disk that determines the direction and angle of rotation.

When attached to a circuit, the rotary encoder position can provide feedback about the speed and position of the object it is measuring.

Encoder.

How to Section

This section will give information about how to use the Resonance Systems Kit with an Encoder, either with the Tripod or Ariel Kit.

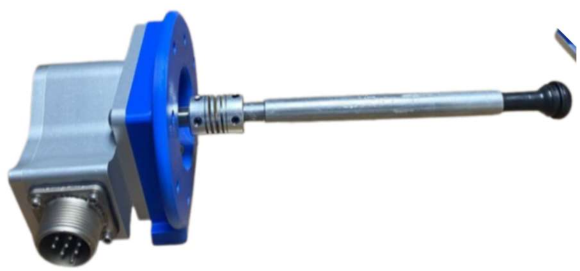
Components needed

QTY	Description	Part Number
1	Encoder	RES-ENCODER
1	Cable	CA-RC7-SH-NC-15
1	Coupling	ENC-COUP-H
1	Shaft	ENC-SHAFT
1	Allen Wrench	
1	Tripod	TRIPOD
1	Ariel Kit	AR-MT
1	Pulse	Pulse
1	Lenz	LNZ

Hands-on

Follow the next steps:

1. Use the Allen wrench to assemble the Coupling, Shaft, and Encoder together. As the picture show:



Assembly Encoder set, Coupling and Shaft

2. Connect the cable to the encoder. Connect the 7 pin Amphenol connector to the encoder:

Connecting Encoder Cable to Encoder

3. Once it has been assembled, there are two options to mount it on the machine.

a) **Tripod**. Mount the Encoder on the Tripod as shown in the next picture. For more details click the following link.

[Click here]

Once it is mounted, hold it with an elastic band. The tip of the shaft must be touching the crankshaft without slipping. Refer to the picture below.

Encoder Mounted and Assembly on the Tripod.

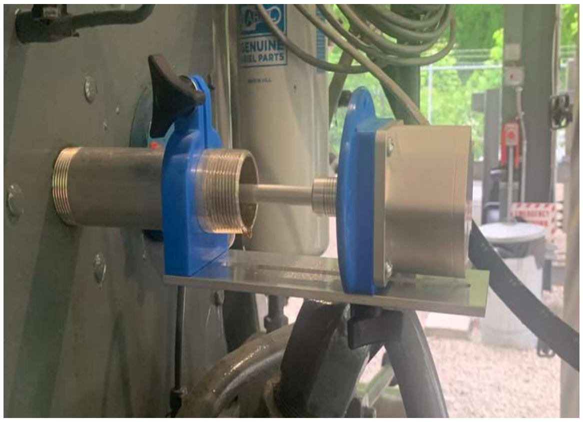
b) **Ariel kit.** Assembly the Encoder on the Ariel kit. As shown below:

Ariel set is ready to mount.

To mount the Encoder set on Ariel compressors, first, remove the plug from the crankcase.

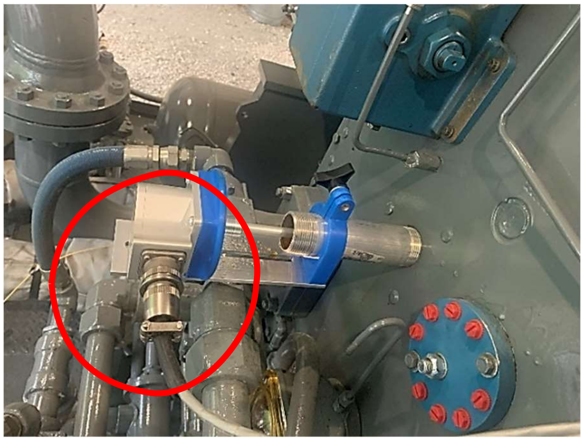
Then screwed the tube where the Ariel cap crankcase was located to later assemble the Ariel set, as seen in the next picture.

Introduce the Encoder set in the tube and adjust the knob to hold both. Then push the Encoder set to the crankshaft until the tip of the shaft touches the crankshaft without slipping. Then adjust or turn the knob below the set. As shown picture below:



Ariel Kit Mounted on Ariel Crankcase Compressor.

4. Connect the Encoder cable to the Encoder connector.



Connecting the Encoder Cable to Encoder

5. In this step, there are two options to connect it. Either Wireless or Non-Wireless.

a) Wireless. Connect the Cable end Amphenol connector of the Encoder Cable, to the Pulse connector that is labeled "Encoder".

Connecting Encoder Cable to Pulse.

b) Non-Wireless. Use the Lenz for this option. The LENZ has an Amphenol connector that is labeled "SYNC." Connect the Amphenol connector end of the Encoder Cable to this connector.

Connecting the Encoder Cable to Lenz.

6. Turn on the Pulse and the Lenz. Note that the Pulse and the Lenz connect to each other. Both lights must be blinking at the same rate.

Tips

The speed reading on the Rmonix will be ~ 594 rpm if no signal is detected. Otherwise, the actual rpm will be shown.

No brute force is necessary to avoid the tip of the shaft slipping.

Double-check if slipping is happening with the Strobe light.

Keep looking for a while with the Strobe light to see if no slipping is happening.

Click the following link for a video showing the Encoder setup, field use, and data collection sing Rmonix.

Strobe

The Strobe light fires a high-intensity light at a specific frequency. The light is triggered by the speed signal from the tachometer, the light turns on once per revolution.

This allows the light to be synchronized with the operating speed of the machinery.

The Strobe Light allows adjusting to match the crankshaft TDC reference mark with the fixed mark reference.

Strobe Light

How to Section

This section will give information about how to use the Resonance Systems Kit with the Strobe Light.

Components needed

QTY	Description	Part Number
1	Strobe Light	RES-STROBE
1	Strobe Cable	ENC-CBL-15
1	Pulse	Pulse

Hands-on

Follow the next steps:

1. Connect the Cable end Amphenol connector of the Strobe Cable, to the Pulse connector that is labeled "Strobe".

Connecting the Strobe Cable to Pulse.

2. Connect the other Cable end to the Strobe. The fisher connector connects to Strobe light.

Connecting the Strobe Cable to the Strobe Light

3. Turn on the Pulse and the Lenz.

Note.

Pulse and the Lenz connect to each other. Both lights must be blinking at the same rate.

Before continuing, it is assumed that the TDC mark reference is already placed either on the Engine or Compressor.

---

4. With the Strobe Light in your hands, check if the TDC mark reference matches the fixed mark reference. If not, use the buttons to move it forward or backward as necessary. If the references match, then it is ready to continue collecting data.

Matching the reference marks with Strobe Light

Matching the reference marks with Strobe Light

Tips

If using the Encoder and can't match the TDC mark, it's probable that the tip of the Encoder shaft is slipping.

Keep looking for a while with the Strobe light to see if no slipping is happening.

The Strobe Light will keep blinking. Do not have an on/off button.

By default the rpm signal to the LENZ is 594 rpm. The strobe will blink at this rate, even if the encoder is not moving.

Click the following link for a video showing the field use.

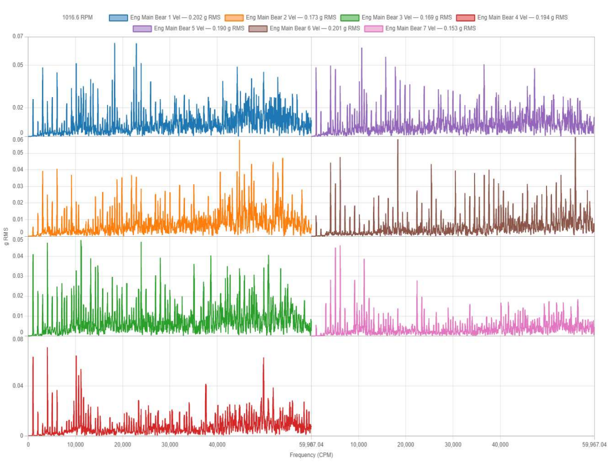
Vibration

Vibration analysis is a process that monitors the levels and patterns of vibration signals within a component, machinery, or structure, to detect abnormal vibration events and to evaluate the overall condition.

It is commonly conducted both on the time waveforms of the vibration signal directly, as well as on the frequency spectrum, which is obtained by applying Fourier Transform on the time waveform.

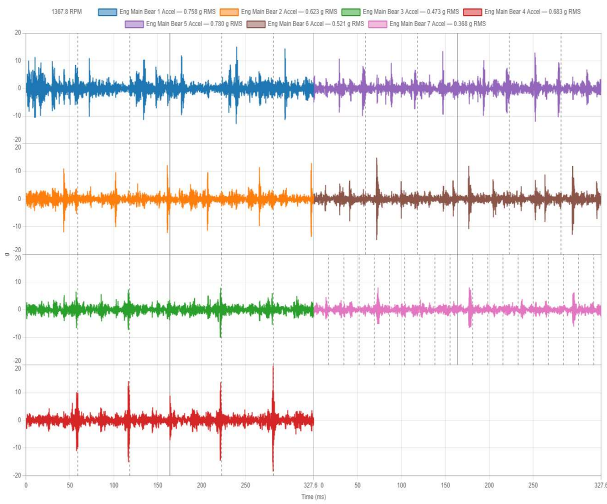
There are three primary types of vibration sensors, each with its own advantages and disadvantages:

Accelerometers. Are excellent sensors for bearing and gear fault detection, or just about any faults that are in the mid to high-frequency range, including short-duration impacts.



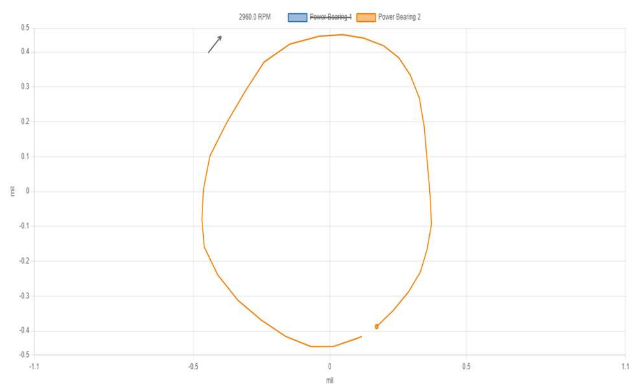
Example. Acceleration Vibration Spectrum Data

Velocity Sensors. Are used for low to medium-frequency measurements. As compared to accelerometers, velocity sensors have lower sensitivity to high-frequency vibrations, making them less susceptible to amplifier overloads.



Example. Waveform Vibration Data

Displacement Sensors (Proximity Probes or Eddy Current Probes). Are effective and accurate at low frequencies (around 0-10Hz). Proximity sensors measure the movement (vibration) of a shaft relative to a sleeve bearing or other supporting (fixed) parts.



Example. Displacement vibration reading – Orbit.

Accelerometer

An accelerometer works by converting mechanical energy into electrical energy.

The force caused by vibration or a change in motion (acceleration) causes the mass to "squeeze" the piezoelectric material which produces an electrical charge that is proportional to the force exerted upon it.

Accelerometers measure vibration by monitoring acceleration and converting it into voltage.

How to Section

This section will give information about how to use the Resonance Systems Kit with an Accelerometer.

Components needed

QTY	Description	Part Number
1	Accelerometer	RES-ACCEL
1	Cable	AV-CBL-6
1	Flat Surface Magnet	F Magnet
1	Lenz	LNZ

Hands-on

Follow the next steps:

1. Screw the magnet base to the base of the accelerometer.

Accelerometer with Flat Magnet Mounted

2. Connect the 2-socket MIL spec connector by screwing it to the 2 pin connector of the accelerometer.

Connecting the Accelerometer to the 2 socket connector

3. Connect the other end cable to Lenz. The fisher connector connects to either channel A or B of the Lenz. Check the channel that has been set up for acceleration in Rmonix.

Connecting the fisher connector to Lenz

4. Turn on the Lenz.

Tips

If data gathering requires TDC synchronization, a speed signal is needed.

Choose the flat surface magnet if high-frequency measurements are required.

Click the following link for a video showing the field use.

XYZ Box

The XYZ Box is used to connect up to 3 uniaxial vibration devices at the same time to a single channel of Lenz – channel "T".
This allows connecting with up to 5 channel vibration devices at once in Lenz.
This gives the ability to take vibration data at given necessities, is a versatile tool that can be used for a variety of purposes.

How to Section

This section will give information about how to use the Resonance Systems Kit with a XYZ Box

Components needed

QTY	Description	Part Number
1	XYZ Box	
1	Cable	TRIAX-CBL-6
3	Cable	MAG-P/U-CBL
1	Lenz	LNZ

Note

The XYZ Box can only be used with uniaxial Accelerometers and Velocity Sensors.

For displacement sensors refer to the proximity kit.

Hands-on

Follow the next steps:

1. Connects the XYZ Box to the cable TRIAX-CBL-6. The Amphenol connector connects to the XYZ Box.

Connecting the Triax to the Cable

2. Connect the other end cable to Lenz. The fisher connector connects to the channel "T".

Connecting the Triax Cable to Lenz

3. Connect the BNC female connector of the cable MAG-P/U-CBL to the BNC male

4. XYZ Box

connecter of the XYZ Box. Repeat with each cable MAG-P/U-CBL

Connecting the Mag Pickup Cable to the BNC – XYZ Box

5. On the other side of the cable MAG-P/U-CBL connects to either the accelerometers or velocity sensors. Refer to steps 1 & 2 of the Accelerometer or Velocity Sensor Product Data Sheet.

Up to 5 Accelerometers can be connected to Lenz.

6. Turn on the Lenz.

Click the following link for a video showing the field use.

The main advantage of triaxial accelerometers is that they can measure acceleration in three axes. This allows for a more complete understanding of the motion of a system.

An accelerometer works by converting mechanical energy into electrical energy.

The force caused by vibration or a change in motion (acceleration) causes the mass to "squeeze" the piezoelectric material which produces an electrical charge that is proportional to the force exerted upon it.

Triaxial accelerometers are like uniaxial accelerometers, but they have three masses, three springs, and three sensors. This allows them to measure acceleration in all three axes.

Accelerometers measure vibration by monitoring acceleration and converting it into voltage.

Triaxial Acceleration Sensor

How to Section

This section will give information about how to use the Resonance Systems Kit with a Triaxial Accelerometer

Components needed

QTY	Description	Part number
1	Triaxial Accelerometer	
1	Cable	TRIAX-CBL-6
1	Flat Surface Magnet	
1	Lenz	

Hands-on

Follow the next steps:

1. Screw the magnet base to the base of the Triaxial Accelerometer.

Triaxial Acceleration Sensor with Magnet Mounted

2. Connects the Triaxial Sensor to the cable TRIAX-CBL-6. The Amphenol connector connects to the Triaxial Sensor.

Connecting the Cable to the Triax

3. Connects the cable to the Lenz. The fisher connector of the cable TRIAX-CBL-6 connects to channel "T".

Connecting the Triax cable to Lenz

4. Turn on the Lenz.

Tips

If data gathering requires TDC synchronization, a speed signal is needed.

Choose the flat surface magnet if high-frequency measurements are required.

It is possible to take up to 5 vibration readings at once.

Click the following link for a video showing the field use.

Velocity Sensor

An accelerometer works by converting mechanical energy into electrical energy.
A moving coil velocity sensor is made up of two main components, a moving coil, and a permanent magnet in whose magnetic field the coil is moving and generating its own power.

Any given vibration input will induce generator action (electromotive force) producing a voltage, which is proportional to the input velocity of the sensor.

Velocity Sensor

How to Section

This section will give information about how to use the Resonance Systems Kit with a Velocity Sensor.

Components needed

QTY	Description	Part Number
1	Velocity Sensor	RES-VEL
1	Cable	AV-CBL-6
1	2 Pole Magnet	
1	Lenz	LNZ

Hands-on

Follow the next steps:

1. Screw the magnet base to the base of the velocity sensor.

Velocity Probe Sensor with 2 Pole Magnet

2. Connect the 2-socket MIL spec connector by screwing it to the 2-pin connector of the sensor.

Connecting the Velocity sensor to the 2 socket connector

3. Connect the other end cable to Lenz. The fisher connector connects to either channel A or B of the Lenz. Check the channel that has been set up for Velocity Sensor in Rmonix.

Connecting the fisher connector to Lenz

4. Turn on the Lenz.

Tips

If data requires TDC synchronization, a speed signal is needed.

Choose the flat surface magnet if high-frequency measurements are required.

Click the following link for a video showing the field use.

Spark

Monitoring the high voltage required by the spark plug allows us to verify the condition of the sparkplug, and cables.

The principle of operation of current clamps is based on the principle of electromagnetic induction.

When an electric current flows through a conductor, it creates a magnetic field around the conductor. The strength of the magnetic field is proportional to the strength of the current.

A current clamp is a device that measures the magnetic field created by an electric current. The current clamp has two jaws that are opened and closed around the conductor. When the jaws are closed around the conductor, the magnetic field created by the current magnetizes the jaws.

The magnetization of the jaws is proportional to the strength of the magnetic field. The sensor converts the magnetization into an electrical signal.

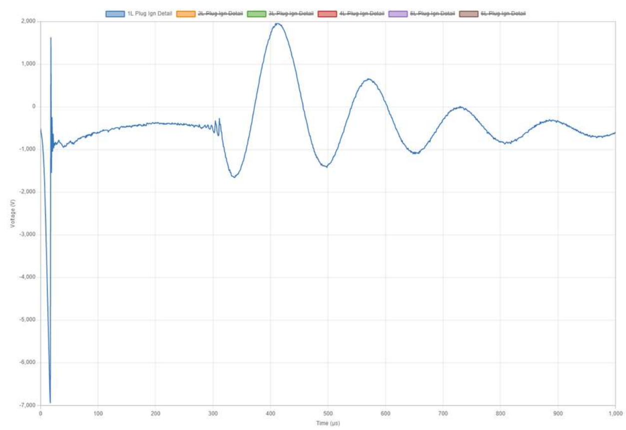
There are two types of diagnostics the ignition systems:

Primary ignition. It works with the primary circuit of the ignition systems. Evaluate the voltage given by the power supply to the coil ignition.
Secondary ignition. It works with the secondary circuit of the ignition systems. Evaluate the voltage given to the spark plug.

A bit about Secondary Ignition

Ignition systems have two circuits that result in a spark being fired at the end of a spark plug. The primary circuit is between the battery and the ignition coil. The secondary circuit is between the ignition coil and the spark plug.

A secondary ignition circuit consists of three components: An ignition coil, Distributor, Spark plug.



Example. Secondary Ignition reading

Using this information an analyst can determine the health of the secondary ignition circuit loop and diagnose potential issues.

Secondary Ignition

The principle of operation of current clamps is based on the principle of electromagnetic induction.
When an electric current flows through a conductor, it creates a magnetic field around the conductor. The strength of the magnetic field is proportional to the strength of the current.

A current clamp is a device that measures the magnetic field created by an electric current. The current clamp has two jaws that are opened and closed around the conductor. When the jaws are closed around the conductor, the magnetic field created by the current magnetizes the jaws.

The magnetization of the jaws is proportional to the strength of the magnetic field. The sensor converts the magnetization into an electrical signal.
A measuring clamp is designed to measure ignition voltages in the range of +/- 50,000 volts

Secondary Ignition Cable

How to Section

This section will give information about how to use the Resonance Systems Kit with a Secondary Ignition Cable

Components needed

QTY	Description	Part Number
1	Secondary Ignition Cable	SEC-IGN
1	Lenz	LNZ

Hands-on

Follow the next steps:

1. The Secondary Ignition Cable (SEC-IGN) connects to Lenz. The fisher connector of the Secondary Ignition Cable connects to channel “T” of Lenz. as shown below:

Connecting Secondary Ignition Cable to Lenz.

2. To use the Secondary Ignition Cable (SEC-IGN) open the clip.

Opening the Clip

Secondary Ignition

3. Clip over the Secondary Ignition Cable as shown below:

Clipping over the secondary ignition cable.

Click the following link for a video showing the SEC-IGN set-up, field use, and data collection using Rmonix

Click here

Ultrasonic + Temperature

Our ultrasonic sensor is a microphone sensor that converts sound waves into electrical signals. It consists of several key components, including a diaphragm, a transducer, and output circuitry.

When sound waves reach the microphone, they cause the diaphragm to vibrate. The diaphragm is a thin and flexible membrane that moves in response to changes in gas pressure. This vibration of the diaphragm is directly proportional to the incoming sound wave pressure variations.

The diaphragm's movement affects the distance between it and a fixed backplate, thereby altering the capacitance between the two. Capacitance is the ability to store electrical charge. As the diaphragm moves closer to or farther away from the backplate, the capacitance changes.

The varying capacitance signal generated by the diaphragm and backplate interaction is then fed into the transducer. The changing capacitance caused by the diaphragm's movement affects the electrical charge on the electret, resulting in a corresponding electrical signal.

The electrical signal generated by the transducer is initially weak and requires amplification to make it usable. The microphone's output circuitry includes amplifiers and other components that boost and refine the electrical signal's strength and quality.

The processed signals are then analyzed to identify patterns or characteristics associated with leaks.

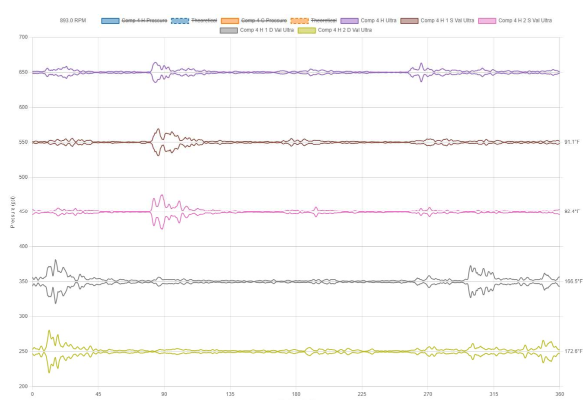
The nipple or cover helps isolate the sensor's receiving elements from the surrounding environment. Providing a defined acoustic chamber helps ensure that the received ultrasonic waves are not significantly affected by external noise or interference.

An infrared sensor operates by emitting infrared radiation and detecting its interaction with objects in its vicinity. The sensor's emitter releases infrared light, which is a form of electromagnetic radiation with a longer wavelength than visible light. When this emitted radiation encounters an object, it can undergo several interactions.

The infrared sensors detector is designed to capture the infrared radiation that is either reflected or transmitted by objects. The detector, which can be a photodiode or a phototransistor, detects infrared radiation and generates an electrical signal in response. The strength of this signal depends on the amount of infrared radiation detected.

The electrical signal from the detector is then processed by the sensor's control circuitry. This processing stage typically involves amplifying and analyzing the signal to extract relevant information.

The Resonance Ultrasonic + Temperature sensors are integrated into one sensor called Ultronix. This allows collecting both data at the same time if the setup is so.



Example. Ultrasonic trace data and Temperature readings

Ultronix

The Ultronix ultrasonic sensor is a high-frequency ultrasonic microphone for use with Resonance's Lenz analysis system. The sensor also contains an integrated infrared temperature sensor so the user may collect temperature information along with the ultrasonic waveforms.

The Resonance Ultrasonic + Temperature sensors are integrated into one sensor called Ultronix. This allows collecting both data at the same time if the setup is so.

The Ultronix sensor has a physical button to take data. Either the button of the Tablet or the Ultronix can be used to capture the data.

Ultronix Sensor

How to Section

This section will give information about how to use the Resonance Systems with the Ultronix sensor.

Components needed

QTY	Description	Part Number
1	Ultronix	RES-ULT-IR
1	Ultronix Cable	ULT-CBL-6
1	Lenz	LNZ

Hands-on

Follow the next steps:

1. Connect the cable to the Ultronix. One of the fisher connectors of the Ultronix Cable connects to the Ultronix connector, as shown below:

Connecting the cable to the Ultronix.

2. Connect the other end cable to Lenz. The other fisher connector connects to either channel A or B of the Lenz. Check the channel that has been set up for Ultrasonic or Temperature readings in Rmonix.

Connecting the cable to the Lenz..

3. Turn on the Lenz.

Tips

The cover or the nipple of the sensor must be touching the surface without openings.

Use either the sensor button or the button on the Rmonix – Tablet to capture the data.

Click the following link for a video showing the field use.

Pressure

In a pressure-volume (PV) diagram, a pressure sensor plays a crucial role in capturing and representing the pressure characteristics of a gas or fluid within a system throughout a thermodynamic cycle.

It is designed to detect and convert the applied pressure into an electrical signal that can be further analyzed and plotted on the PV diagram.

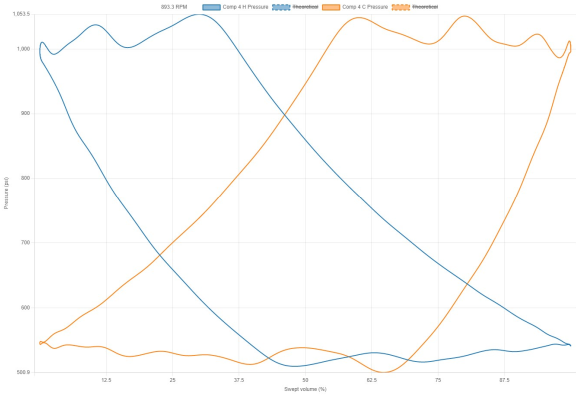
During the thermodynamic cycle, the pressure sensor records the pressure at various key points or intervals during critical events such as compression, expansion, or phase changes.

The pressure readings obtained from the sensor are then plotted on the PV diagram. The PV diagram is a graphical representation with pressure depicted on the vertical axis and volume on the horizontal axis. By plotting the pressure values at different volumes, a curve or path is formed, illustrating the system's pressure variations throughout the cycle.

Analyzing the PV diagram allows for a comprehensive understanding of the system's performance. It provides insights into processes such as compression work, expansion work, heat transfer, and the overall efficiency of the system. Additionally, the PV diagram aids in evaluating the system's energy exchange, including work done on or by the system and the heat absorbed or released.

The Resonance kit has Two types of sensors. High-temperature pressure readings are found in the combustion chamber of the engines. To have a more precise reading and long-lasting sensor a cooled pressure sensor was created.

The standard Pressure sensor is use for typical pressure readings in compressors, where the temperature reaches through the thermodynamic cycle does not affect either the quality of the data or the integrity of it.



Example. P-V diagram

Pressure

A pressure sensor measures the force exerted by gas and converts it into an electrical signal.

At the core of a piezoresistive pressure sensor is a pressure-sensitive diaphragm. When pressure is applied to the sensor, the diaphragm deforms in response to the force exerted by the gas.

The diaphragm is typically equipped with piezoresistive elements, which are resistors that change their resistance when subjected to mechanical stress.

When pressure is applied and the diaphragm deforms, the resistance of the piezoresistive elements changes, and an electrical signal is generated. To measure this change, the piezoresistive elements are connected in a Wheatstone bridge circuit, resulting in a small differential voltage output. The magnitude of this output voltage is proportional to the applied pressure.

The output voltage is then sent to the output circuitry of the pressure sensor. This circuitry amplifies and processes the voltage signal to make it suitable for measurement or further use. The output can be in the form of an analog voltage or current signal.

Cooled Pressure Sensor

Standard Pressure Sensor 90º Connector

How to Section

This section will give information about how to use the Resonance Systems with the Pressure sensor.

Components needed

QTY	Description	Part Number
1	Pressure Sensor	CMP-PS-xxxx
1	Cool Pressure Sensor	RES-PS-xxxx
1	Cable	PS-CBL-6
1	Lenz	LNZ

Hands-on

Follow the next steps:

1. Connect the Amphenol connector by turning it to the 6-pin connector of the Pressure Sensor.

Connecting the Pressure Sensor to the cable

2. Connect the other end cable to Lenz. The fisher connector connects to either channel A or B of the Lenz. Check the channel that has been set up for Pressure readings in Rmonix.

Connecting the Pressure Sensor to the Lenz.

3. Turn on the Lenz.

Note

Be sure to add a calibration step in the Rmonix route before readings.

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4. Connect the Pressure sensor to the Kiene Valve. Connect it by screwing it to the Kiene valve using the wrench 1¼" in size.

Connecting the Pressure Sensor to the Kiene Valve

5. Open the Kiene valve using the ⅝" wrench.

Tips

Before connecting the pressure sensor, vent the Kiene valve a little. Open it by 90 degrees only, then close it and connect the Pressure sensor.

When using the 1¼" wrench do not fasten too much, just enough to make sure no leaks.

Click the following link for a video showing the field use.