

Sensor Mounting

The sensor should be located in a position where engine block vibrations are directly coupled to the sensor. Ideally this location should be on a boss on the engine block, inline with the point of combustion. Care should be taken when selecting a suitable location. Locations of excessive noise, such as the valve train may effect the operation of this device.

Note: The sensor should be located avoiding areas of extreme temperature. The sensor cable must be routed avoiding areas of electrical interference (i.e. Do not route the sensor cable next to your HT leads!)

Operation

With the system mounted and all connection securely made, switch on the ignition. The display will show the "Phormula" start-up screen. The system will then display the system settings and knock readings.

The system can be tested by tapping adjacent to the sensor with a metal object such as a spanner. Care should be taken to avoid hitting the sensor directly.

Familiarise yourself with the system settings in the following sections before attempting to configure the KS-3.

System Settings

System Settings can be accessed by moving the navigation dial slowly in a down direction repeatedly. The screen orders are as follows:

	Screen Name
1	Data Display
2	Bandwidth Settings
3	Gain Settings
4	Alert Settings
5	Restore Defaults
6	Quickstart Settings
7	Software Version

Data Screen

The data screen shows the current knock reading, the maximum knock reading and a bar graph display.

Resetting Peak Hold

Peak/Max readings can be reset by briefly pressing the navigation dial inwards.

Bandwidth Settings

Bandwidth settings can be accessed by moving the navigation switch downwards repeatedly until the words "System Settings" and "BAND – XXX kHz" are displayed. Press the navigation switch inwards briefly and the words "Scroll to change" will appear. Bandwidth can then be altered by moving the navigation dial upwards or downwards. Press the navigation switch inwards to specify a new setting.

Gain Settings

Gain settings can be accessed by moving the navigation switch downwards repeatedly until the words "System Settings" and "GAIN – XX" are displayed. Press the navigation switch inwards briefly and the words "Scroll to change" will appear. Gain can then be altered by moving the navigation dial upwards or downwards. Press the navigation switch inwards to specify a new setting.

Alert Settings

Alert settings can be accessed by moving the navigation switch downwards repeatedly until the words "System Settings" and "ALERTS" are displayed. Press the navigation switch inwards briefly and the words "Scroll to change" will appear. Alert levels can then be altered by moving the navigation dial upwards or downwards. Press the navigation switch inwards to specify a new setting.

When the knock readings exceed the Alert threshold the system will display a visual warning and an audible alert will sound. A white LED indicator will illuminate until the peak values are reset.

Restore System Defaults

The system can be reset to factory defaults by accessing the "RESTORE DEFAULT" screen.

Quickstart

The KS-3 displays the current system settings during startup. By setting Quickstart to "ON" in the settings menu, the system will no longer display these settings during start-up.

Graphical Display

If the alert setting is switched off the bar graph will display a range from 0-100. If an alert limit has been set the bar graph will display a fraction of the alert limit i.e. at an alert threshold of 40 the bar graph will be at its maximum when a value of 40 is reached.

Configuring the KS-3

The engine must be operating correctly prior to configuring the KS-3.

1. Ensure KS-3 Alerts are turned off.
2. Set the Bandwidth setting to the expected engine knock frequency.
3. Run the engine under load to full power and check the peak readings.
4. Repeat step 3 adjusting the Gain settings until the KS-3 peak readings display approximately 40.
5. Configure the Alert to trigger above the peak value.

An increase in the peak reading when the engine is under load is an indication of detonation occurring. Tests showed readings of greater than 80 when detonation was occurring, however this value will vary depending on the engine and location of the sensor.

The bandwidth settings are a centre frequency. Frequencies either side of the centre frequency are also detected, but to a lesser extent.

FAQ

Id	Question	Answer
1	Why does the device display a value for Knock when the engine is operating normally?	All engines produce a wide range of frequencies during normal operation. The KS-3 will read and display engine noise.
2	I can't locate the sensor directly on the block. Will the device operate correctly?	The KS-3 is sensitive to sensor location. Readings may be taken from other locations such as the engine head; however the distinction between engine noise and detonation may not be as clear.
3	Can I cut and extend the sensor cable?	The sensor cable is shielded to reduce interference. The cable can be extended using a similar shielded cable. Additional cable can be purchased from www.phormula.co.uk
4	I'm getting inconsistent readings?	Check routing of the sensor cables. These must be routed avoiding sources of electrical interference.
5	I'm getting occasional spikes and I'm certain my engine is not knocking?	Check connections to the sensor plug and FAQ 4. Check sensor location is suitable.
6	Can I provide power to the KS-3 from a source other than the cigarette lighter adapter provided?	The KS-3 may be powered from a 1A fused 12v dc source. Modifications to the power cable or supply should be conducted by a qualified automotive electrician.

System Screen Navigation

The following table shows navigation through the system screens.

Current Screen	Action		
	Button Down	Button Up	Button Click
Data Screen	Bandwidth Settings	-	Reset Max Knock Reading
Bandwidth Settings	Gain Settings	Data Screen	Change Bandwidth Settings
Gain Settings	Alert Settings	Bandwidth Settings	Change Gain Settings
Alert Settings	Restore Defaults	Gain Settings	Change Alert Settings
Restore Defaults	Quickstart	Alert Settings	Restore Default Settings
Quickstart	Version Information	Restore Defaults	Change Quickstart Settings
Version Information	-	Quickstart Settings	-

Warning: This product is for off road use only and should be installed by a qualified Automotive Electrician.

This device should not be used as the sole method of knock detection whilst tuning an engine. Incorrect configuration, electrical interference or poor electrical connections may result in incorrect knock readings.

For Technical Support email: support@phormula.co.uk

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Introduction

Thank you for purchasing the KS-3 Knock Analyser. This manual provides fitting and usage instructions. For technical support please email support@phormula.co.uk.

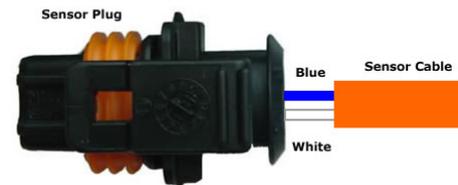
Installation Overview



1. Mount the Knock Sensor
2. Assemble sensor plug
3. Connect signal cable
4. Connect the power cable
5. Configure KS-3 settings

Sensor Plug Assembly

TOP VIEW



NOTE: The signal cable must be connected observing polarity.

Use heat shrink tubing to cover the sensor cable and rear plug housing.