Instrument Handbook

MK:440
Environmental Noise Sensor

Cirrus Research plc

Produced by Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH, United Kingdom.

Reference Number P181AQ1 Rev F

Contents

1 Important information

There are two variants of the MK:440 available:

- MK:440 approved for use in Class 1: Division 2 locations
- MK:440N which is not approved for use in hazardous locations

The MK:440 is approved for use in Class 1: Division 2 environments as follows:

Class 1 Division 2 Groups C, D T4
Class 1 Zone 2 AEx/Ex ec llB T4
(-30°C≤Ta≤+60°C)

Each MK:440 unit will have its own output levels. Please refer to the factory calibration setup information for details for your specific instrument.

The MK:440 is supplied with the configuration preset to meet those ordered from the factory.

Calpot R1 is referred to in section 8 for calibration. This is the only setting that should be altered, if required, by the user during a Reference Calibration.

2 Product Description

The sound monitoring device (MK:440) is suitable for use in Class 1 Division 2 hazardous locations when installed in accordance with these instructions. The device conforms to: IEC 60079-0 and IEC 60079-15 and is suitable for outdoor installation with a rating of IP54.

The MK:440 is supplied with a ½" NPT connection that conduit may be connected to or a 1/2" gland.

3 Technical information

Parameter	Value			Unit
	Min.	Typical	Max.	
POWER voltage	12	24	27	VDC
LOOPIN voltage	12	24	30	VDC
Current	20		50	mA
Current loop output*	4	-	20	mA
Current loop impedance	-	-	400	Ω
Captive lid screw tightening torque	3		4	Nm
Terminal block tightening torque (J7 & J8)	0.5		0.6	Nm
Weight		2.6		kg
Dimensions(L,W,H)		75,125,480		mm
Operating Temperature	-10		50	°C

*The current output is proportional to the A-weighted noise level, at low noise levels the output can be below 4mA.

4 Conditions for use

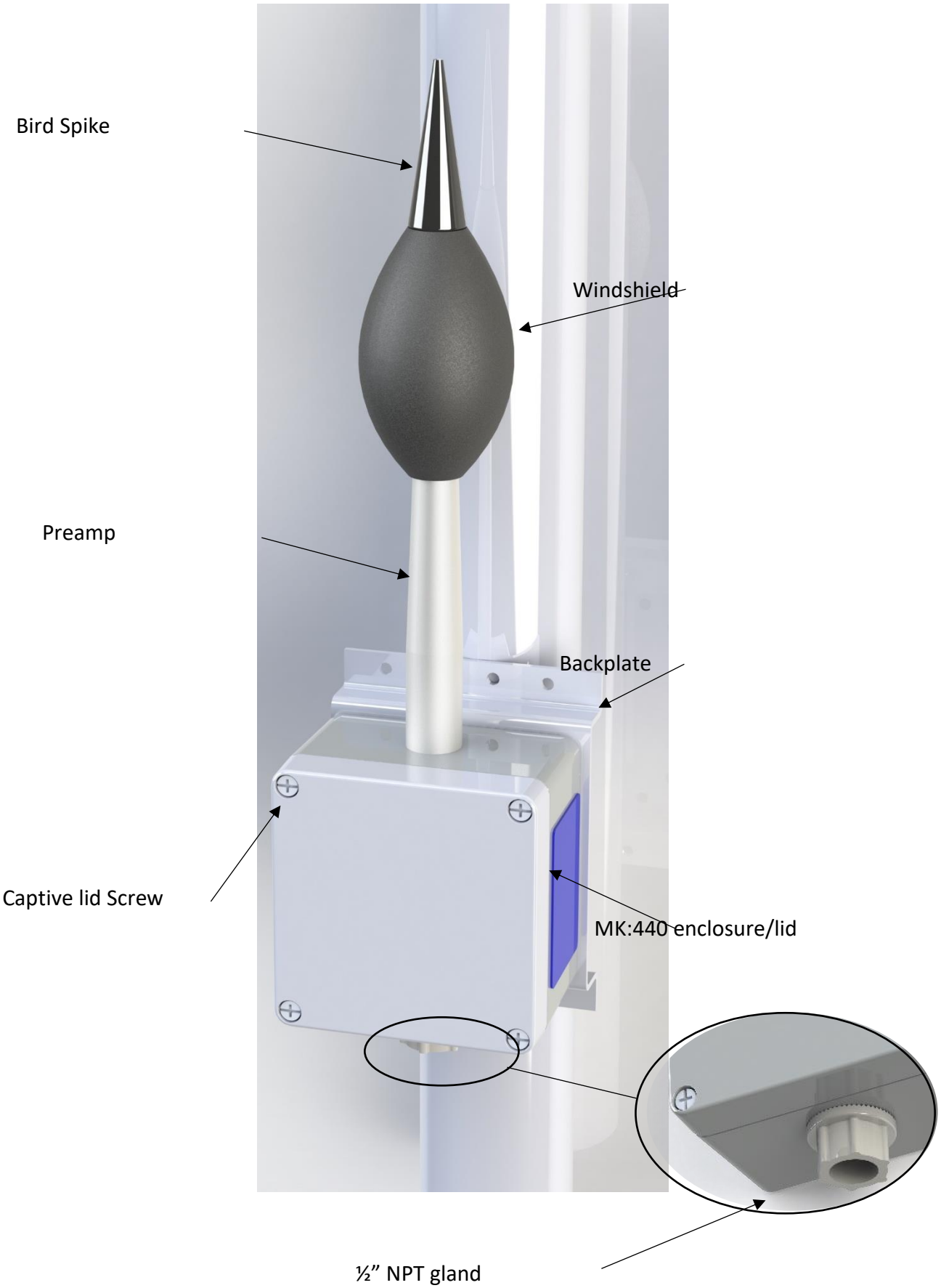
WARNING – DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED

Never replace components unless power is disconnected, or the area is free of ignitable concentrations. The unit should be returned to Cirrus for repair, any changes made to the unit will invalidate its approval.

A portion of the enclosure is non-conducting and, under certain extreme conditions, may generate an ignition-capable level of electrostatic charges. The user shall ensure that the equipment is not installed in a location where it may be subjected to external conditions (such as high-pressure steam) which might cause a build-up of electrostatic charges on non-conducting surfaces. Additionally, cleaning of the equipment should be done only with a damp cloth.

The user shall ensure that the equipment is not installed in a location where it is continuously exposed to ultraviolet light.

5 MK:440 Overview



The standard version of the MK:440 has a 4-20mA current loop which outputs a current level, expressed in milliamperes that is proportional to the sound level with either a 'Fast' or 'Slow' Time Weighting. The choice of time weighting is a factory set option made at the time of purchase.

To calibrate the MK:440 an 94dB acoustic calibrator must be used. The connected system should then adjust the interpreted level to 93.7dB, see the example below for how to do this.

The output is always weighted with the 'A' frequency weighting which is the most commonly used frequency weighting for the measurement of environmental and industrial noise levels.

The 4-20mA current loop output is ideal for integration to many process measurement and control systems where your own system loggers and software can provide an accurate representation of the 'live' noise levels and also store data.

Your own interface system will need programming with a simple formula which is outlined on your Factory Configuration Information sheet.

For Example:

For a unit with a range of 64 to 134 dB (the default setting if not specified)

Sound Pressure Level | dB = (10 x I) +20 |

(Where "I" is the output current in mA)

Therefore, in this example an output current of 7.4mA would represent a noise level, L_A, of 94.0dB(A) as shown below:

dB(A) = (10 x 7.4) +20

dB(A) = 74 +20

dB(A) = 94

Please check with our technical department if you need confirmation about the settings of your equipment or if you need any other technical guidance.

6 Installation

Once you have received shipment of your new MK:440 Noise Sensor unit, follow the next stages to setup and install the equipment.

6.1 Inspection

Visually inspect the components of the MK:440 and ensure everything is in order. In the unlikely event that there is a problem with the unit contact your distributor in the first instance.

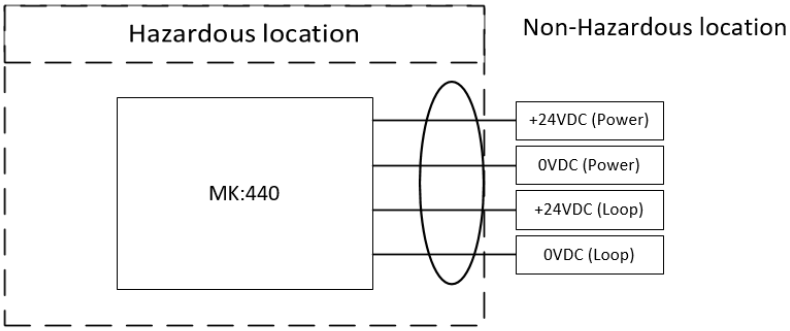
6.2 Location

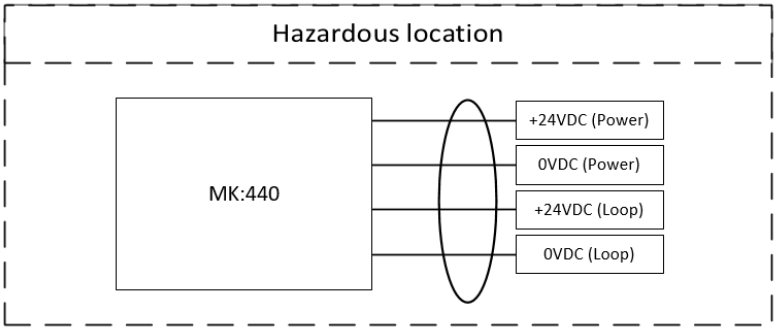
Every site and application are different but here are some basic guidelines for effective positioning of your Noise Sensor:

- It is usually worth conducting a noise survey or referring to measurement data from a recent noise survey to understand the noise profiles for the area.
- Install the sensor at a location nearby to where the environmental noise is most likely to have an impact.
- Legislation often specifies where measurements should be made, for example at property boundaries or at a complainant's property.
- Try to mount the unit away from obstacles and building walls.
- The microphone should always be a minimum of 1.2 – 1.5m above the ground level.
- Avoid, where possible, overexposed areas where high wind speeds will affect the noise level readings.

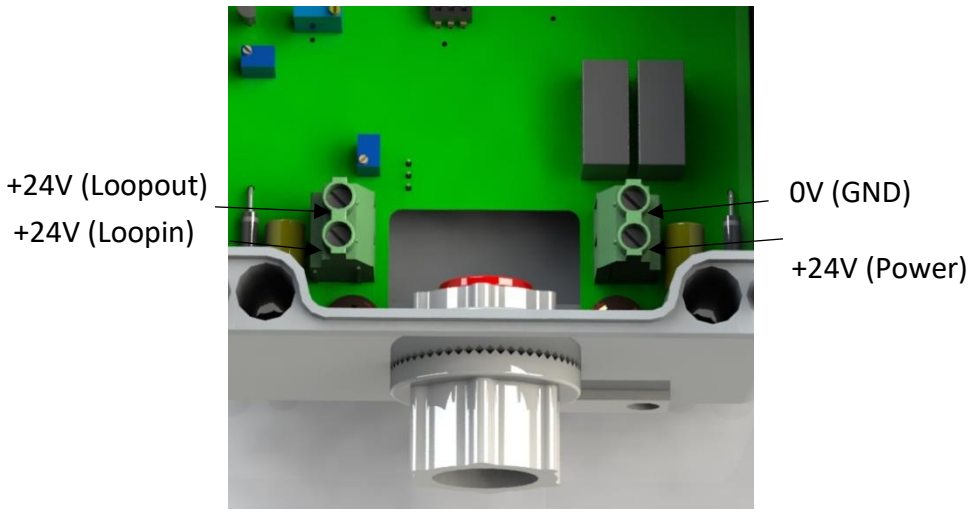
6.3 Installation and wiring

The MK:440 must be wired in accordance with the National Electric code (NFPA 70) or the Canadian Electric Code (CSA C22.1). An installation drawing below shows the electrical connections to be made to the device, note that the power and loop signals can come from a combination of non-hazardous and hazardous locations as long as it is suitably rated.





Wherever possible the MK:440 should be wired outside of any potentially explosive atmosphere. A single conductor must be used in each port.
The cross-sectional area of the conductor must be between 0.2mm^2 and 0.6mm^2. The cable must have a temperature rating of at least 80°C and ideally be UL rated. The power and current loop supply must be connected as follows:

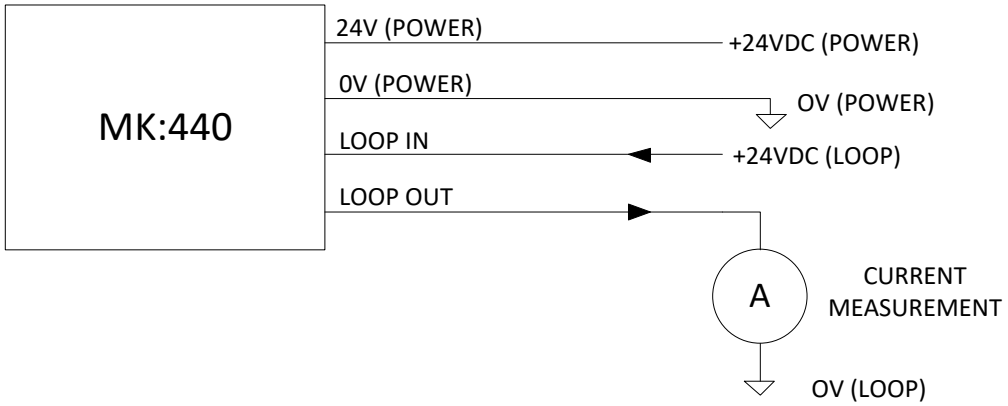


There must be no conductor extending beyond the terminal block, strip wires no more than 10mm.

It is the operator's responsibility to ensure cable routing, conduits and connection to the unit meets with any local safety regulations.

It is advised to perform a calibration before placing the lid on the enclosure (see section 8), adjusting the calibration potentiometer as necessary. If wall mounting kit BP:440 is being used it should also be attached to the MK:440 before placing the lid on the enclosure.

A typical wiring diagram is shown below:

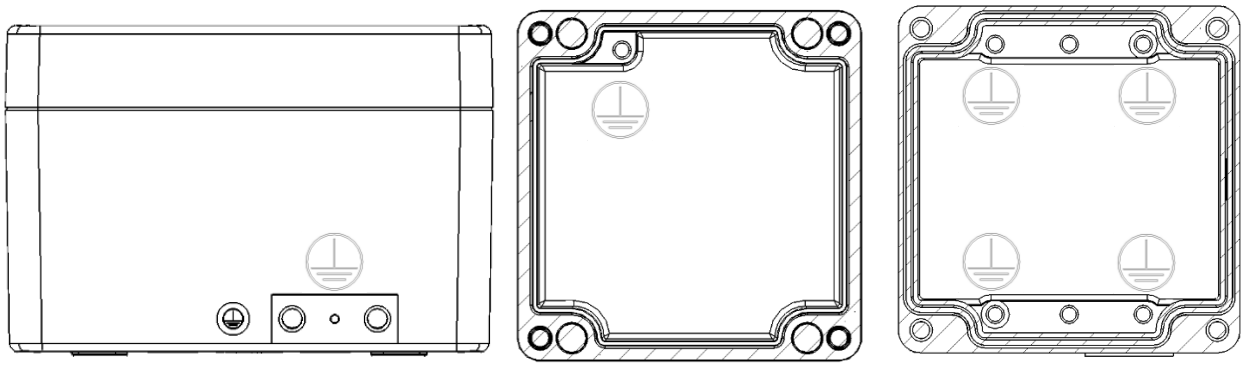


7 DC Voltage output option

To convert the 4-20mA output current to a DC voltage output, connect LOOPOUT to the Loop Power Input Ground via a 100ohm resistor for a voltage across the resistor of 10mV/dB.

7.1 Earth bonding

The MK:440 has several earth bonding points, it is essential the product is connected to a suitable ground connection. Earthing points are illustrated below:



Note that the external and internal earths of the enclosure share an electrical connection, but the lid does not. Both parts of the enclosure must be connected to a suitable ground connection.

8 Maintenance & calibration

The system is designed to be durable and should not need routine maintenance other than calibration. Under no circumstances should the preamp be removed from the enclosure and never remove the microphone from the preamp.

It is recommended that the system is calibrated once a year to maintain the accuracy of the system, it requires removal of the lid of the MK:440 and must be carried out by a competent person in a suitable environment.

Remove the windshield and top preamp assembly by holding the windshield and black preamp and unscrewing gently to avoid damaging the windshield. The will expose the microphone allowing an acoustic calibrator to be placed over it.

A CR:514/CR:515 can be used to set an absolute reference point for the system. The calibrator emits a 94dB tone, the current output then needs to be measured to determine the level being measured by the device. Turning the screw on the blue resistor marked “CAL” will adjust the current output. You will need to refer to your configuration to determine the correct current level for the calibrator output (typically 94dB, see section 5 for an example on current levels).

If turning the “CAL” screw does not allow you to reach the required current level then it is likely that there is a problem with the device and should contact your distributor.

8.1 Optional Accessories

The following accessories may be ordered separately from your distributor as required.

Windshield:	UA:440
Wall mounting Kit:	BP:440

9 Available Ranges and Equations

The following ranges can be specified for factory delivery (64-134dB is the default setting if not specified):

Nominal Range	DIP SW1/1	DIP SW1/2	DIP SW1/3	I_OUT (mA) DC	Example Value at 9.4mA
64-134dBA	ON	OFF	ON	dB = (10 x I) + 20	114dB
54-124dBA	ON	ON	OFF	dB = (10 x I) + 10	104dB
44-114dBA*	OFF	OFF	ON	dB = (10 x I)	94dB
34-104dBA*	OFF	OFF	ON	dB = (10 x I) – 10	84dB
24-94dBA	OFF	OFF	OFF	dB = (10 x I) – 20	74dB

*Note: To change from 114dB to 104dB, adjust the cal pot R1

Appendix 3 CE Declaration of Conformity

Cirrus Research plc Hunmanby UK
CE Certificate of Conformity

Manufacturer: Cirrus Research plc
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Equipment Description

The following equipment manufactured after 30th May 2018

MK:440 Environmental Noise Microphone

Along with standard accessories

According to EMC Directives 89/336/EEC and 93/98/EEC

meet the following standards

EN 61000-6-3 (2001)

EMC : Generic emission standard for residential, commercial and light industrial environments.

EN 61000-6-1 (2001)

EMC : Generic immunity standard for residential, commercial and light industrial environments.

Signed Dated 1st April 2022

M. Williams
Chief Engineer

11 Cirrus Research Offices

The addresses given below are the Cirrus Research plc offices. Cirrus Research plc also have approved distributors and agents is many countries worldwide. For details of your local representative, please contact Cirrus Research plc at the address below. Contact details for Cirrus Research authorised distributors and agents are also available from the Internet Web site at the address shown below.

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