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FOR THE NAME OF YOUR NEAREST AUTHORIZED NILES DEALER CONTACT: NILES AUDIO CORPORATION, P.O. BOX 160818, MIAMI, FLORIDA 33116-0818.

Please fill in your product information and retain for your records.

Model MS220 Purchase Date _____
Serial No. _____

SPECIFICATIONS

IR System

Compatible with virtually all brands of remotes using carrier frequencies between 25kHz and 90kHz

IR Receiving Range

Varies depending on remote strength; Typically 20' to 35' (6.10 meters to 10.67 meters)

IR Receiving Angle

30° off-axis (horizontal and vertical) at 25' (7.62 meters)

Mounting

Surface-mount. Improved self-adhesive mounting strip included

Unit Dimensions

Overall Unit: 2" Wide x 1 1/16" High x 1/2" Deep (5.08 cm Wide x 1.74 cm High x 1.27 cm Deep)

all MS220's main system unit and on the IR main system unit. Consult your IR main system unit's manual for more detail.

If the MS220 does not work, and the LED

"flickers" blue or remains solidly lit: Cover up the Sensor with a piece of cardboard (your hand will actually create electromagnetic interference under some conditions). Observe the IR test LED.

IR Feedback LED Off:

Optical Interference.

IR Test LED On or Flickering:

Electromagnetic Interference.

EMI (Electromagnetic Interference)

Identify the source of the interference. The most common sources of electromagnetic interference are listed in the Installation Considerations section. To eliminate EMI try the following methods:

1. Move the sensor or the sensor cable away from the EMI source or move the source of the EMI away from the sensor or the cable.
2. Connect the Sensor's GND terminal to true earth ground (if this isn't feasible use the main system unit's GND terminal).

There are many methods for reducing interference. Which solution is best for you depends on your situation.

If you require further assistance call Niles Technical Support at 305-238-4373 or 1-800-289-4434 (M-F 8:00 AM - 7:00PM ET).

You can also email Niles Technical Support at support@nilesaudio.com.

OPERATION

3. Test for interference from the following sources:

- Neon, Compact Florescent Lighting (CFL), or halogen lights in the room
- Light dimmers, beginning with those closest to the MS220

Observe the MS220's LED while performing all the tests. It is possible to have interference from more than one source.

Eliminating optical feedback

In some installations, two conditions combine to create an optical feedback loop. Symptoms can include: poor range, intermittent operation or no operation.

The conditions which sometimes combine to create a feedback loop are:

1. Both a sensor and a flasher are located within the same room.
2. There is some low-level noise or interference on your system.

You can eliminate optical feedback by replacing any IRB-1 "flooding flasher" with an MF1 or MF2 MicroFlasher® and covering all flashers with the supplied IR blocking covers.

Identifying the type of interference:

The blue "feedback" LED on the front of the MS220 is a useful trouble-shooting aid.

If the MS220 does not work, and the LED does not light at all: Test the remote control(s) by operating the AV equipment directly. Replace the batteries if needed. Double check the cable connections on

OPERATION

Operation of the MS220 is straightforward. Simply aim your hand-held remote at the MS220. Your IR command is instantly repeated to your AV equipment. A blue "feedback" LED on the MS220 visually confirms the reception of an IR signal.

TROUBLESHOOTING

This manual contains instructions for the MS220 only. For specific information on the adjustment and operation of your Niles infrared extender system, please refer to the instruction manual included with your Niles IR main system unit (MSU140, MSU250, MSU480, MSU440Z).

The bi-color blue/green LED on the front of the MS220 is a useful troubleshooting aid.

The blue LED should light only when a infrared remote signal is being received. If the LED on the MS220 "flickers", and the MS220 functions normally, there is no cause for concern, some stray IR signals are being received by the MS220 but are not being repeated.

1. Test the remote control(s) by operating the AV equipment directly. Replace the batteries if needed.
2. Double check the cable connections on all MS220's and on the main system unit. Look for open, shorted or reversed wires.

INSTALLATION

You may splice the MS220 cable to another cable by soldering or crimping the connections. Make sure that you maintain proper polarity and correct connections through the splice.

Connecting to the main system unit

1. Strip 1/4" of insulation from the end of each wire. Tightly twist the end of each wire until no frayed ends remain.
2. Use a small flathead screwdriver or your thumbnail to raise the locking tabs, exposing the holes on the removable connector plug of the MSU.
3. Insert each wire into the appropriate hole on the removable connector plug, and snap the locking tab down. To help you, the connector plug is keyed. Insert the smooth side of the connector plug into the smooth side of the socket. Don't force the scalloped side of the connector plug into the smooth side of the socket.
4. Double-check all connections. This manual contains instructions for the MS220 only. For specific information on the adjustment of your Niles Infrared system, please refer to the instruction manual included with your Niles IR main system unit.



BLENDING HIGH FIDELITY AND ARCHITECTURE®

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INTRODUCTION

The MS220 IR MicroSensor® is designed for use with Niles infrared extender systems.

Installed in a remote room location, the MS220 receives the IR commands transmitted from your existing hand-held remotes in that room. The commands are carried via a CAT-5 cable to your AV equipment in another room, and instantly “repeated”.

The MS220 is compatible with all current Niles infrared systems. It may be used along with, or as an alternative to, the Niles TS120, MS120, MS220, WS120 and CS120 sensors or the IntelliPad®.

The MS220 is just one part of the three building blocks necessary to complete a Niles IR repeating system:

- **IR Main System Unit**—Models MSU140, MSU250, MSU480 and MSU440Z
- **IR Sensors/Keypads**—Models WS120, TS120, MS120, MS220, CS120 and the IntelliPad
- **IR Flashers**—Models MF1, MF1VF, MF2, MF2VF and the IRB1

An IR sensor expansion hub, Model IRH610, is available to provide additional sensor inputs to your system.

In a typical system (Figure 1) the MS220 remote room sensors are placed in convenient locations and are connected to a main system unit.

The main system unit is connected to power via its 12VDC power supply. In this example, the MSU250 main system unit powers 2 MF2 MicroFlashers® which are attached to the front panel sensor windows of four AV components.

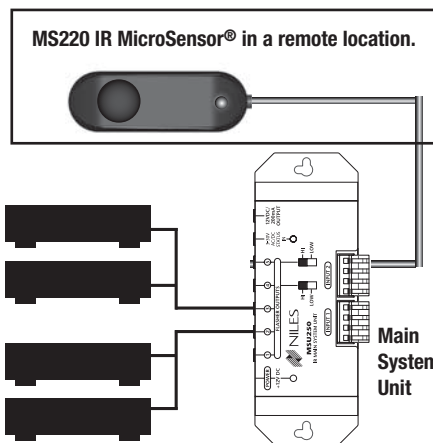


Figure 1

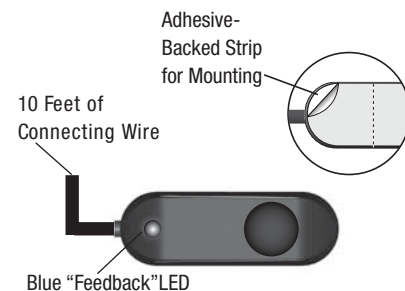
FEATURES & BENEFITS

The MS220 offers a number of improvements over other miniature IR sensors

- Wideband High-Fidelity Design enables operation with virtually any brand of equipment

- Patent Pending Universal Noise Suppression enables operation in virtually any environment: near plasma and LCD displays, compact fluorescent lights, and indirect sunlight
- Excellent IR receiving range— you get 20' to 35' (6.10 meters to 10.67 meters) of remote control range (depending upon the strength of your handheld remote)
- Small size of only 2" wide x 11/16" high x 1/2" deep (5.08 cm wide x 1.75 cm high x 1.27 cm deep)— fits almost anywhere
- 10' connecting cable included
- Printed circuit board design uses surface mount technology (SMT), assuring high reliability
- Available in black, white or silver
- Two year parts and labor limited warranty

MS220 PARTS GUIDE



INSTALLATION CONSIDERATIONS

Wiring MS220 MicroSensors

From every IR Sensor location, you must “home-run” a cable back to the main system unit. “Home-run” means an individual cable is connected between each IR Sensor and the main system unit. You should never daisy-chain (connect in parallel) two or more IR Sensors to a single input. (Figure 2).

Type of Cable

The MS220 connects to the Niles Infrared Main Systems Unit or IRH610 sensor expansion hub with an individual home run of CAT-5 cable. When running wires inside walls, most states and municipalities in the U.S. specify that you must use a special type of wire. Usually, the requirement is that the wire has a specific “CL” fire rating, such as “CL-2” or “CL-3”. Consult your Niles dealer, building contractor, or local building and inspection department if unsure about which type of wire is best for your application.

MS220 Mounting Location

Locating the MS220 in the center of a room usually results in the most even IR receiving coverage, especially if the room is square shaped. Rooms that are L-shaped or long and narrow require more careful consideration. With these types of rooms, installing the MS220 closest to the primary location of the user will ensure the best performance.

The MS220 is designed to surface-mount almost anywhere. Convenient mounting locations for the MS220 include:

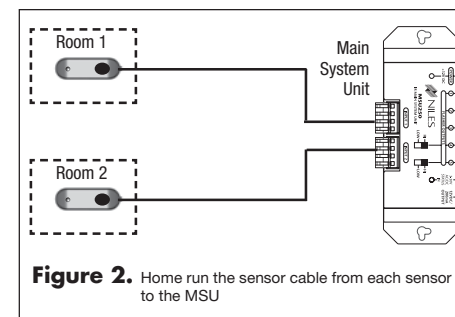


Figure 2. Home run the sensor cable from each sensor to the MSU

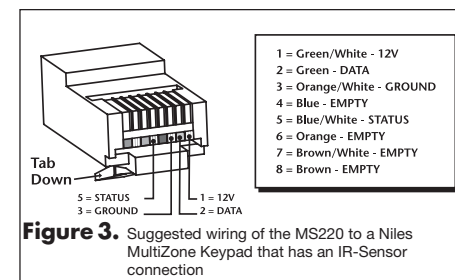


Figure 3. Suggested wiring of the MS220 to a Niles MultiZone Keypad that has an IR-Sensor connection

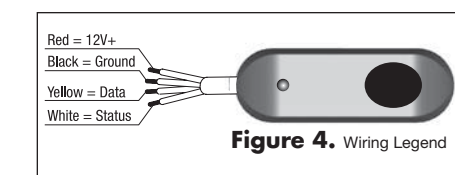


Figure 4. Wiring Legend

- On the front panel of a television set, facing the viewer
- On the front surface of a wall, a cabinet, an appliance, or a speaker grille
- Behind a speaker grille (speaker grilles typically reduce the effective range of an MS220 to 15')

Receiving Range and Pickup Angle

The receiving range of the MS220 will vary according to the IR output strength of the remote control being used. Remote strength varies among brands by the number and size of the batteries used, and how many IR emitters the remote has. For example, remotes that operate on two small AAA batteries and have only one IR emitter are generally not as strong as remotes that use the larger AA size batteries and have two emitters. Tests with various manufacturers' remote controls have shown that the operating range can vary from a minimum of 20 feet to a maximum of about 35 feet. The IR pickup angle of the MS220 is 30° off-axis (horizontal and vertical) at 25'.

Infrared signals travel essentially line-of-sight. They will not pass through or around solid objects. Do not rely on an IR signal being able to “bounce” off a wall or reflective object to the MS220.

Avoiding Electrical Interference

Avoid locating the MS220 near any potential sources of Electro-Magnetic Interference (EMI). The most common sources are:

1. Light dimmers or variable speed controls for ceiling fans. These controls emit more interference when turned down halfway. They emit little or no interference when turned up all the way (brightest or highest position).
2. Large appliances (air-conditioners, pumps, motors, compressors; etc.).
3. AC line noise (noise brought into the system via the wall outlet connected to the main system unit).

Concealing the wire

If you are installing the wire into an existing wall, take time to consider any possible obstructions which may be hidden inside the wall, such as wood or metal studs, electrical, telephone or other types of wiring, plumbing, AC or heating conduit, old wall safes, etc.

If the MS220 cable needs to pass through any cabinetry (or other obstruction) drill a hole where the cable will run. Make sure the hole accommodates the width of the cable.

Using the MS220 with the Niles MultiZone Keypad that have an IR-Sensor connection

The MS220 is fully compatible with Niles Keypads that have an IR-Sensor Connection, follow the wiring instructions in Figure 3. For specific information see your Niles MultiZone Keypad manual.

INSTALLATION

Determine a mounting location for the MS220. If there is a potential source of EMI near the proposed mounting location (e.g near an electrical dimmer) you must test to find the best (interference-free) position before mounting the MS220 in place.

When testing for the best position, remove only a small portion of the adhesive. A scored backing allows for that test. When the best position is determined, clean and dry the mounting position. Remove all the adhesive backing for permanent placement.

Testing for EMI (Electro Magnetic Interference)

1. Turn on the device. If it is a wall mounted light dimmer turn the dimmer knob to the halfway position.
2. Connect the MS220 to a main system unit and plug in the 12VDC power supply.
3. Place the MS220 in the proposed mounting location and observe the blue “Feedback” LED.
3. If it flickers or lights constantly, this indicates a high level of electrical and/or IR interference. Move the MS220 housing to a location where the LED does not light.

Extending the cable

Once the cable is in place, label the cable ends for future reference. The MS220 is supplied with 10' of pre-stripped IR cable. The IR cable may be lengthened as needed. The IR cable may be lengthened by splicing it to a recommended CAT-5 cable (See Installation Considerations—Type of Cable).