



Network Ultima[®] Relay Module

instruction manual

WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR USING OR SERVICING THE PRODUCT. Like any piece of complex equipment, the unit will perform as designed only if it is installed, used and serviced in accordance with the manufacturer's instructions. OTHERWISE IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE PERSONAL INJURY OR DEATH.

The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not used and serviced in accordance with the instructions in this manual. Please protect yourself and others by following them. We encourage our customers to write or call regarding this equipment prior to use or for any additional information relative to use or repairs.

In the U.S., to contact your nearest stocking location, dial toll-free 1-800-MSA-INST. To contact MSA International, dial 1-412-967-3354.

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Manufactured by
MSA INSTRUMENT DIVISION
P.O. Box 427, Pittsburgh, Pennsylvania 15230

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MSA Instrument Warranty

1. **Warranty-** Seller warrants that this product will be free from mechanical defect or faulty workmanship for a period of eighteen (18) months from date of shipment or one (1) year from installation, whichever occurs first, provided it is maintained and used in accordance with Seller's instructions and/or recommendations. This warranty does not apply to expendable or consumable parts whose normal life expectancy is less than one (1) year such as, but not limited to, non-rechargeable batteries, sensor elements, filter, lamps, fuses etc. The Seller shall be released from all obligations under this warranty in the event repairs or modifications are made by persons other than its own or authorized service personnel or if the warranty claim results from physical abuse or misuse of the product. No agent, employee or representative of the Seller has any authority to bind the Seller to any affirmation, representation or warranty concerning the goods sold under this contract. Seller makes no warranty concerning components or accessories not manufactured by the Seller, but will pass on to the Purchaser all warranties of manufacturers of such components. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, AND IS STRICTLY LIMITED TO THE TERMS HEREOF. SELLER SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**
2. **Exclusive Remedy-** It is expressly agreed that Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of Seller, or for any other cause of action, shall be the repair and/or replacement at Seller's option, of any equipment or parts thereof, which after examination by Seller is proven to be defective. Replacement equipment and/or parts will be provided at no cost to Purchaser, F.O.B. Seller's Plant. Failure of Seller to successfully repair any nonconforming product shall not cause the remedy established hereby to fail of its essential purpose.
3. **Exclusion of Consequential Damage-** Purchaser specifically understands and agrees that under no circumstances will seller be liable to purchaser for economic, special, incidental or consequential damages or losses of any kind whatsoever, including but not limited to, loss of anticipated profits and any other loss caused by reason of nonoperation of the goods. This exclusion is applicable to claims for breach of warranty, tortious conduct or any other cause of action against seller.

General Warnings and Cautions

⚠ WARNINGS

1. The Network Ultima Relay Modules described in this manual must be installed, operated and maintained in strict accordance with their labels, cautions, warnings, instructions, and within the limitations stated.
2. To prevent ignition of a hazardous atmosphere, the cover of an explosion-proof model of the Network Ultima Relay Module must be kept tightly closed when power is applied. Before removing the cover for maintenance or calibration, ensure the surrounding atmosphere is and remains free of toxic or combustible gases until the cover is closed.
3. Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair instrument performance. Repair or alteration of the Network Ultima Relay Module, beyond the scope of these maintenance instructions or by anyone other than an authorized MSA service personnel, could cause the product to fail to perform as designed and persons who rely on this product for their safety could sustain serious personal injury or death.
4. The general-purpose model of the Network Ultima Relay Module can be a source of ignition resulting in an explosion if mounted in an area where a flammable mixture of combustible gas and air is present. If such a location must be monitored, install only the explosion-proof model and follow all national and local codes and practices for installation in these areas.
5. This device contains transmitter module FCC ID:OUR9XSTREAM. The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

In order to comply with the FCC RF exposure requirements, this unit may be used only with Approved Antennas that have been tested with this radio. A minimum separation distance of 20 cm must be maintained from the antenna to any nearby persons. Changes or modifications to the

radio or antenna could void the user's authority to operate this product.

Failure to follow the above can result in serious personal injury or death.

⚠ CAUTIONS

1. Do not connect equipment to the relays rated higher than the relay ratings. Relay operation may fail as a result.
2. The Ultima Relay Module must not be painted. If painting is done in an area where a Relay Module is located, care must be exercised to ensure that paint is not deposited on the front glass cover. Any paint on the glass cover may obscure the indicators within the module.
3. Protect the Network Ultima Relay Module from extreme vibration. Improper operation may result in over-heating.

Failure to follow the above can result in personal injury and/or equipment damage.

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Chapter 1

General Information

The Network Ultima Relay Module is equipped with internal relays to enable the user to control other equipment such as alarms, ventilation devices, etc.

There are four relays inside this module:

- three alarm relays
- one fault relay.

These relays activate upon a command from the Network Ultima Gas Monitor. When the Monitor detects an alarm condition, it directs the Network Ultima Relay Module to activate the appropriate relay. Similarly, if a fault condition is detected, the Fault Relay is activated.

All Wired Network Ultima Relay Modules are rated explosion-proof, certified for Classification I, Groups B, C and D, Division I Hazardous Locations. When using this module in these hazardous locations, follow all NEC electrical codes for installation.

All Wireless Network Ultima Relay Modules are rated as general-purpose instruments. Follow NEC electrical codes for installation.

The Relay Module is shipped ready for installation with external wiring harnesses. These harnesses provide direct connections to the module, eliminating the need for the enclosure to be opened.

The Network Ultima Relay Module is designed to connect to an integrated system of Wired/Wireless, compatible devices (or "network").

NOTE: The Network Ultima Relay Module can only be used with a Ultima *Plus* network.

You must be familiar with the Chapter 5 network parameters if you intend to use the Network Ultima Relay Module:

- in your own digital network or
- in a setup other than the Relay Module default setup.

Chapter 1, General Information

The Network Ultima Relay Module provides long-distance interconnect ability for:

- many Network Ultima Gas Monitors
- other network compatible devices.

This Manual

- is to be used with, and often refers to, the Network Ultima Gas Monitor Instruction Manual (P/N 710471).
- contains a description of network variables for the Network Ultima Relay Module.

Unpacking Your Unit

Upon receipt, ensure that your package contains:

- Network Ultima Relay Module (P/N 711189 - See FIGURE 1-1) Wireless (P/N 10044954)
- Network Ultima Relay Module Instruction Manual (P/N 711203).

Look through packing material inside shipping container for any items that may have been shipped with the Network Ultima Relay Module.

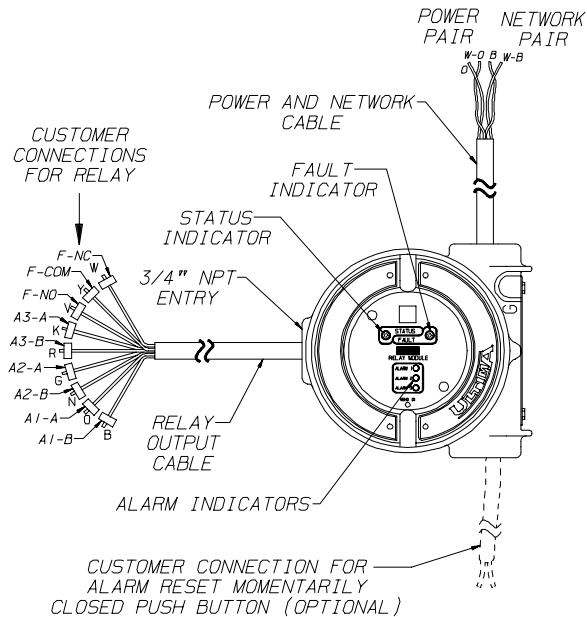


Figure 1-1.
Network Ultima Relay Module (Wired version shown)

Identifying Your Unit

The label on the outside of the shipping carton identifies the module. Verify that the unit you have is correct.; if it is not correct, contact MSA.

Mounting Your Network Ultima Relay

- The Wired Relay Module enclosure is rated for Class I, Groups B, C, and D, Division I hazardous area locations, only when installed according to the National Electrical Code (NEC).
- The Wireless Relay Module enclosure is rated for general-purpose areas.
- Follow all applicable practices and use appropriate conduit and cable glands when installing the Network Ultima Relay Module in a hazardous area.

Mounting The Network Ultima Relay Module

Use one of the following three methods to mount the Network Ultima Relay Module.

Three Mounting Methods

- Mount the Network Ultima Relay Module via the 3/4-inch NPT threads located on either port of the conduit. Install one end of a rigid conduit by threading the conduit into the threads. Ensure that the wires coming out of the port are accessible through the conduit.
- Mount the Network Ultima Relay Module via the optional mounting strap (P/N 697281) which is attached to the rear holes of the module.
- For mining applications, mount the module via the optional hanger bracket (P/N 814513) that can be attached to the rear holes of the Network Ultima Relay Module.

Network Ultima Relay Module Electrical Connections

Typically, there is no need to open the module during the installation because there are no:

- Internal jumpers (with the exception of the Propane/Methane jumper in an IR unit)
- Potentiometers
- Dip switches or other types of adjustments (with the exception of the Channel Selection switch in a wireless unit).

Chapter 1, General Information

All electrical connections to the Relay Module can be made via the factory-installed wiring harness (See FIGURE 1-1). These harnesses are marked to clearly identify all signal connections. There are two cables coming from the Network Ultima Relay Module:

- a power and communication cable (route to the proper power source and network connections)
- a relay output cable (route to any control equipment)

It is not necessary to use the provided power or relay cable. If your installation requirements need a direct connection, the Network Ultima Relay Module can be opened and wired directly. The provided communication cable must be used.

Cable Requirements

- In all Wired installations but Pennsylvania mining installations, it is recommended that the following cable be used to carry the information over the network:
 - (MSA P/N 655548) or (Anixter P/N 192453) or
 - plenum cable (MSA P/N 655770) or (Anixter P/N 2231KR).
- For Pennsylvania mining installations:
 - use cable (MSA P/N 655267 or Anixter P/N 182453).
 - do not use any other cable type. Using other types of cable will cause the network and the sensor to fail.

⚠ WARNING

For Wired units, do not use any cable other than : (MSA P/N 655548) or (Anixter P/N 192453) OR (MSA P/N 655770) or (Anixter P/N 2231KR) OR, for Pennsylvania mining installations: (MSA P/N 655267) or (Anixter P/N 182453). Using other cable types will cause sensor and network failure, and could result in personal injury and/or death to individuals relying on the sensor or network.

- In all Wired installations, the end of the cable run must be equipped with a terminator. Your particular cable run may need two terminators; generally, two terminators are required for longer cables. Consult systems manual for additional cabling information.
- All wiring connections should be made by following the appropriate wiring code(s).

⚠ WARNING

When installing in a hazardous area, be sure to install your Network Ultima Relay Module according to National Electrical and local procedural codes. Failure to do so can result in serious personal injury or death. Wireless units are general-purpose units only.

TABLE 1-1 shows maximum cable length when using only the Network Ultima Gas Monitor. Other options, such as relays, read-out or control modules may shorten the cable run.

Table 1-1. Maximum Cable Length for Wired Units		
WIRING TOPOLOGY	MAXIMUM DISTANCE WITHOUT REPEATER	ADDITIONAL DISTANCE PER REPEATER
Doubly-terminated bus topology	8850 feet	8850 feet
Free topology	1640 feet	1640 feet

Network Topologies (FIGURE 1-2)

Bus Topology Networks

- A Bus Topology Network may be used to maximize cable length; two Cable Terminators for Bus Topology (P/N SK3108-12) must be installed, one at each end of the cable.

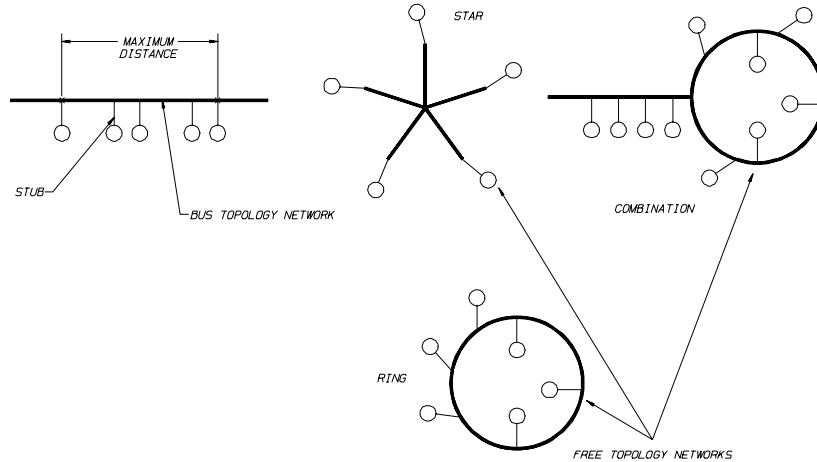


Figure 1-2. Network Topologies

Chapter 1, General Information

- TABLE 1-1 specifies the maximum length of the communication pair; cable stub length must not exceed 9.5 feet.
- Maximum cable length is also determined by the network power pair, which is a function of the:
 - number of devices connected to the power pair and their operating parameters
 - minimum operating voltage for each device
 - maximum current required to operate each device
 - loop resistance of the power pair conductors
- Repeaters and additional power supply may be used to extend the distance.

Free Topology Networks

- A Free Topology Network provides the most wiring flexibility.
- TABLE 1-1 specifies the maximum length, including all cable stubs.
- One Cable Terminator Free Topology (P/N SK3108-14) must be installed on the network near the Data Center PC.
- Repeaters and additional power supply may be used to extend the distance.
- TABLE 1-2 shows the maximum separation distance when using the Wireless Ultima with Digital Output Gas Monitor in conjunction with the Ultima RF Network Relay. Other conditions (such as non-line-of-site or antenna mounting height) may shorten the separation distance.

WIRELESS TOPOLOGY	ANTENNA MOUNTING HEIGHT (FEET)	MAXIMUM DISTANCE
Wireless	10	5280 (FEET)

Wireless Topology

- A Wireless Topology Network provides the most flexibility and is similar to the Free Topology Network.
- TABLE 1-2 specifies the maximum separation distance from any two devices in a Wireless Topology Network.

Installing the Communication Cable

To install the power and communication cable to the Network Ultima Relay Module:

1. Unscrew the Network Ultima Relay Module cover and set it aside.

⚠ WARNING

Before removing the cover of an explosion-proof Network Ultima Relay Module, verify that the surrounding area does not contain a flammable mixture of combustible gas and air, since a source of ignition is exposed; otherwise, an explosion may occur if a metal object contacts the circuitry and produces sparks.

2. Remove the two screws securing the front panel printed circuit board within the Network Ultima Relay Module.
3. Remove the top board from the Network Ultima Relay Module.
4. On Wireless units, remove the two standoffs securing the network printed circuit board to the unit.
5. On Wireless units, carefully remove the network printed circuit board from the unit (two power and two network connections are connected to this board).
6. Route the cable through the port of the Network Ultima Relay Module (see FIGURE 1-3).

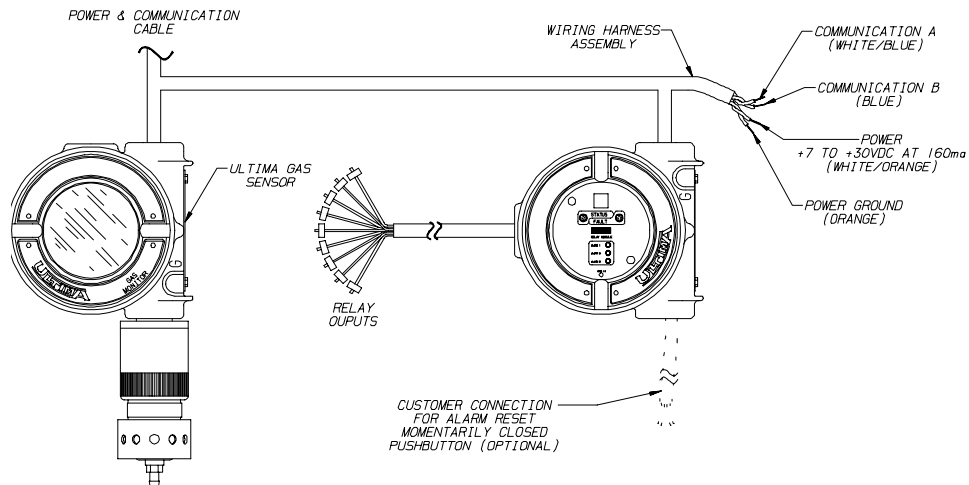


Figure 1-3.
Typical Installation for Power and Relay Connections (Wired version)

7. Install the communication and/or power cable to its mate on the bottom printed circuit board of the Network Ultima Relay Module.
8. On Wireless units, carefully re-install the network printed circuit board removed above.
9. Re-install the top board removed above.
10. Re-install the two screws to secure the top board within the Network Ultima Relay Module. Do not over-tighten the screws.
11. Install the cover of the Network Ultima Relay Module.

⚠ WARNING

Do not let the cover remain off of an explosion-proof Network Ultima Relay Module. Since a source of ignition is exposed, an explosion may occur if a metal object contacts the circuitry and produces sparks in an atmosphere of combustible gas.

Relay Connections

The Network Ultima Relay has four internal relays:

- three alarm relays [single pole, single throw (SPST) type]
- one fault relay [single pole, double throw (SPDT) type.]

If an inductive load (such as a solenoid or motor) is to be controlled, a surge suppression device may be needed. When such loads are switched, contact sparking and electro-magnetic interference may be generated. This can shorten relay contact life and possibly create noise problems within the Ultima enclosure. To avoid such problems, it is recommended to install a *Quencharc[®] across the contacts or load. This device is available from MSA as P/N 630413.

- When using the wiring harness provided with the Relay Module, see FIGURE 1-1 for relay connection.
- TABLE 1-3 lists wire color connections for power and communication cable for Wired units
- TABLE 1-4 lists the power cable wire color connections for the Wireless units.
- TABLE 1-5 lists wire color and associated relay function.

* Registered trademark of ITW Paktron

Table 1-3. Wire Harness Assembly (Wired Units)			
PAIR NO.	COLOR	LABEL	FUNCTION
1	WHITE/ORANGE	+PS	POWER (+7 to +30 VDC at 160 mA)
1	ORANGE	-PS	POWER GROUND
2	WHITE/BLUE	COMA	COMMUNICATION A
2	BLUE	COMB	COMMUNICATION B

Table 1-4. Wire Harness Assembly (Wireless Units)			
PAIR NO.	COLOR	LABEL	FUNCTION
1	BLACK	PWR	POWER
1	WHITE	GND	POWER GROUND

Table 1-5. Wire Color and Associated Relay		
WIRE COLOR	RELAY	TERMINAL BLOCK CONNECTIONS
O	ALARM 1	J1 - 1A
B	ALARM 1	J1 - 1B
G	ALARM 2	J1 - 2A
N	ALARM 2	J1 - 2B
K	ALARM 3	J1 - 3A
R	ALARM 3	J1 - 3B
V	FAULT - NORMALLY OPEN	J2 - NO
Y	FAULT - COMMON	J2 - COM
W	FAULT - NORMALLY CLOSED	J2 - NC

If the wiring harness is not used, the Network Ultima Relay Module must be disassembled for wiring:

1. Unscrew the Network Relay Module cover and place it aside.

⚠ WARNING

Before removing the cover of an explosion-proof Network Ultima Relay Module, verify that the surrounding area does not contain a flammable mixture of combustible gas and air, since a source of ignition is exposed; otherwise, an explosion may occur if a metal object contacts the circuitry and produces sparks.

2. Remove the two screws securing the front printed circuit board assembly and remove the printed circuit board.
3. The alarm relay connections are made via one terminal block (J1 of the top board) (FIGURE 1-4); fault relay connections are made via J2 of the second board. TABLE 1-5 lists the relay connections provided by the terminal block.
4. Remove the wiring harness provided by unscrewing the screw securing the wire to the terminal block. When all wires are loose, remove entire cable from the terminal blocks and discard.
5. Determine the necessary relay functions and route the new cable through the opening of the Network Ultima Relay Module to the wiring terminal blocks. Install the wires as appropriate. Identification of each wire will help in the testing of the functions of these relays.
6. Once wiring is complete, re-install the front-panel printed circuit board assembly, noting that the connector extending from the back side of the printed circuit board must mate with the connector on the lower board. Re-install the screws and secure the cover.

⚠ WARNING

Do not allow the cover to remain off of an explosion-proof Network Ultima Relay Module. Since a source of ignition is exposed, an explosion may occur if a metal object contacts the circuitry and produces sparks in an atmosphere of combustible gas.

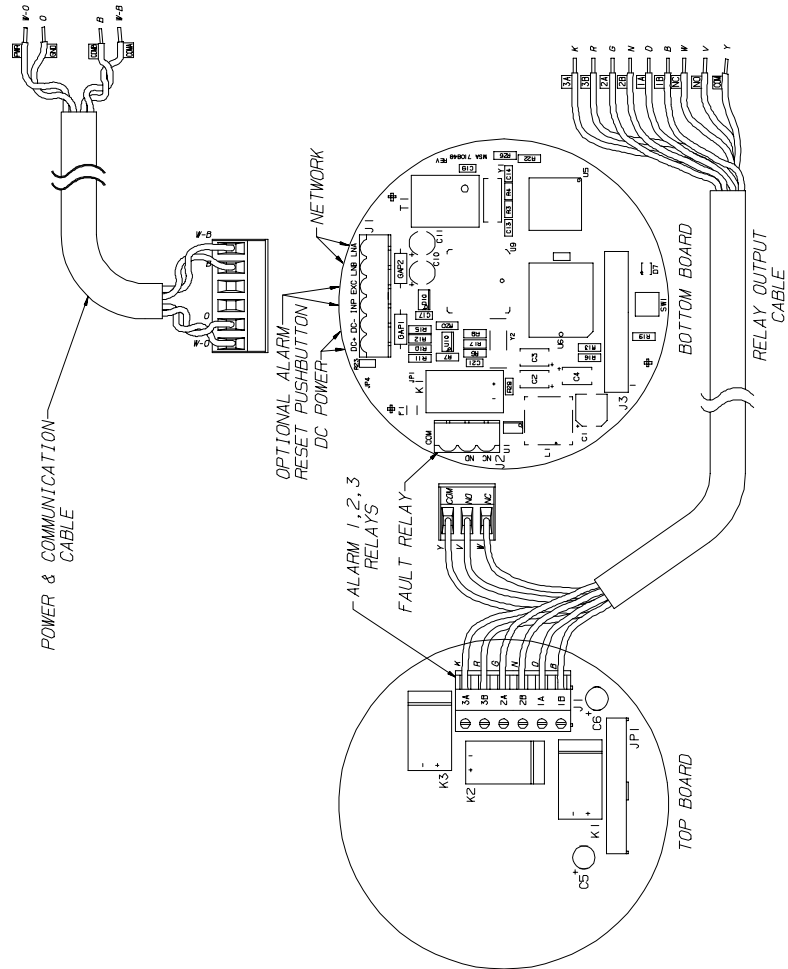


Figure 1-4.
Terminal Block Locations

Optional RESET Push-button

General

The optional RESET push-button is used to locally reset any alarm relays. Once an alarm condition clears, this can be used to reset any latched relays to the non-alarm state.

Selection of the RESET Button

The RESET push-button can be acquired locally during installation of the relay module. The RESET push-button ratings, however, must meet or exceed the area classification where the button is to be used. Install an explosion-proof push-button with the appropriate rating in an area classified as a hazardous area.

WARNING

Do not install a push-button that is rated for a general-purpose area in a location classified as a hazardous area; otherwise, an explosion may occur, as sparks may be produced when the button is pressed.

The RESET push-button must be a normally-open type with a momentary contact when pushed. The electrical ratings must be at least 1 amp at 250 volts AC. TABLE 1-6 lists several sources of push buttons; you may select one listed or obtain one from an alternative supplier.

VENDOR NAME	CATALOG NUMBER	DESCRIPTION
Appleton Electric Co.	EFDB175-U1	Explosion-proof push-button
Crouse Hindes, Inc.	NCS2110	General-purpose push-button

Installing the Optional RESET Push-button

The optional RESET push-button is wired to the terminal block on the second printed circuit board within the Network Ultima Relay Module. The following procedure must be performed:

1. Unscrew the Network Ultima Relay Module cover and place it aside.

⚠ WARNING

Before removing the cover on an explosion-proof Network Ultima Relay Module, verify that the surrounding area does not contain a flammable mixture of combustible gas and air, since a source of ignition is exposed; otherwise, an explosion may occur if a metal object contacts the circuitry and produces sparks.

2. Remove the two screws securing the front printed circuit board assembly and remove the printed circuit board.
3. The RESET push-button wiring connection is made via terminal block J1, positions 3 and 4 (FIGURE 1-5). Route the push-button wires through the opening of the relay module to terminal block J1.

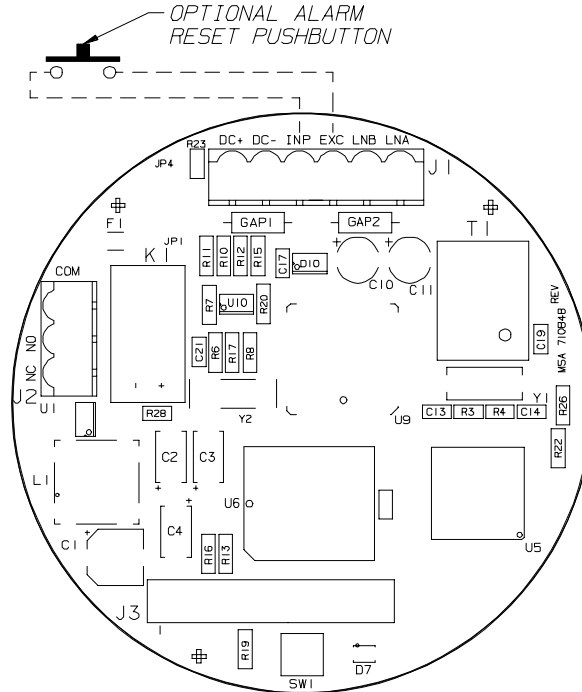


Figure 1-5.
Installing Optional Reset Push Button

Chapter 1, General Information

4. Once wiring is complete, re-install the front panel printed circuit board assembly, noting that the connector extending from the back side of the printed circuit board must mate with the connector on the lower board. Re-install the screws and secure the cover.

⚠ WARNING

Do not allow the cover to remain off of an explosion-proof Network Ultima Relay Module. Since a source of ignition is exposed, an explosion may occur if a metal object contacts the circuitry and produces sparks in an atmosphere of combustible gas.

Chapter 2 Configuration

Network Configuration

- There are three configuration types for the Network Ultima Relay Module; determine your configuration type and refer to the noted chapters for instruction:
 - pre-configured (see Chapter 3)
 - auto-configured (see Chapter 4)
 - data center configured (Wired units only; see Chapter 5).
- The network can be any topology; however, to maximize distance, bus topology is recommended (see Installation Outline Drawing SK3015-334 - for Wired units and 10000015957 for Wireless units).
- Each Network Ultima Relay is considered a node on the network with communication between nodes at a reliable, efficient (78 KB/s for Wired units and 19.5KB/s for Wireless units) rate. In peer-to-peer communications:
 - each node can communicate with every other network node
 - no central supervisory controllers or computers are needed.
- Network protocol is embedded in each Network Ultima Relay Module's firmware for completely transparent operation. The protocol:
 - manages the internal communication within the module
 - constructs and delivers all network communication.
- To ensure the most reliable network communication, each Network Ultima Relay Module contains built-in:
 - data collision detection
 - avoidance capabilities .

Chapter 3 Pre-configured Units

General

- Pre-configured Units are factory-set to communicate with designated Network Ultima Gas Monitors.
- In this configuration, the user simply:
 - installs all of the Network Ultima Gas Monitors and Ultima Relay Modules on the network
 - applies power.
- No additional set-up is necessary.

Start-up

Applying Power

1. Apply power.
 - Verify power by observing that all LEDs turn ON momentarily.
 - The green STATUS LED continues to intermittently flash, indicating proper communication.
2. Verify proper system operation by activating the alarm points on the Network Ultima Gas Monitors.

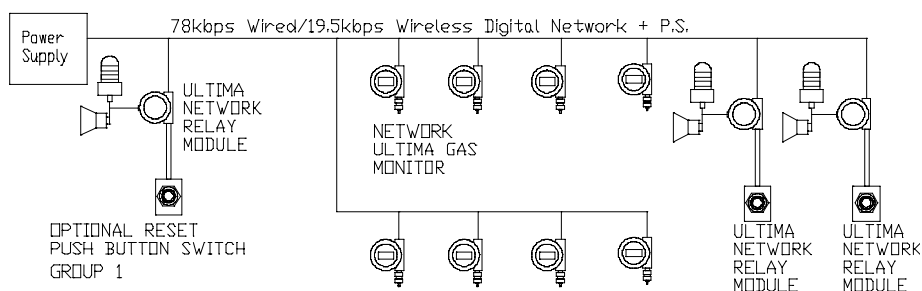


Figure 3-1. Typical Basic Group System for Pre-configured Units

Chapter 3, Pre-configured Units

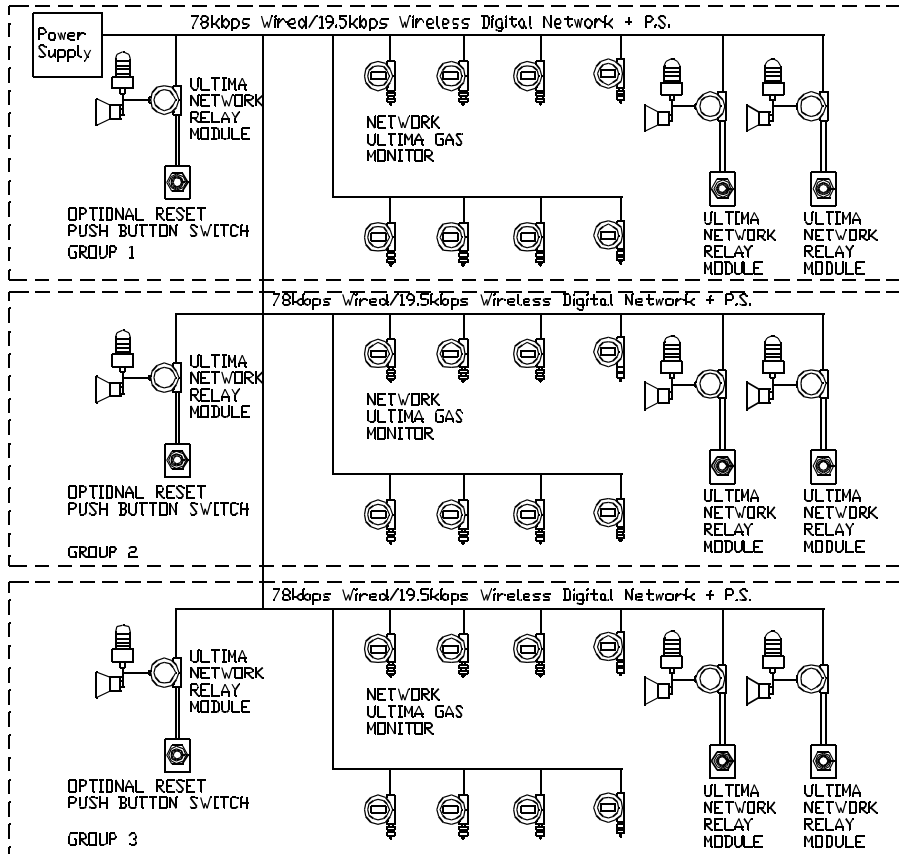


Figure 3-2. Typical Multiple Group System for Pre-configured Units

Chapter 4

Auto-Configured Units

Start-up

Applying Power

1. Apply power.
 - Verify power by observing that all LEDs turn ON momentarily.
 - Only the green STATUS LED continues to intermittently flash.
2. Verify proper system operation by activating the alarm points on the Ultima sensors.

This auto-configure feature enables:

- the user to configure the system without the use of a Personal Computer (PC)
- the unit to install up to eight Network Ultima Gas Monitors and configure them as members of a Group
- one Network Ultima Relay "Master" unit to control the Group
- up to seven Network Ultima Relay "Slave" units to be installed as a member of the Group by the "Master" unit on the Wired Network and three-network Ultima Relay "Slave" units on Wireless Network
- the user to replace an inoperative Network Ultima Gas Monitor or Network Ultima Relay in the Group
- the user to re-assign members from one Group to another.

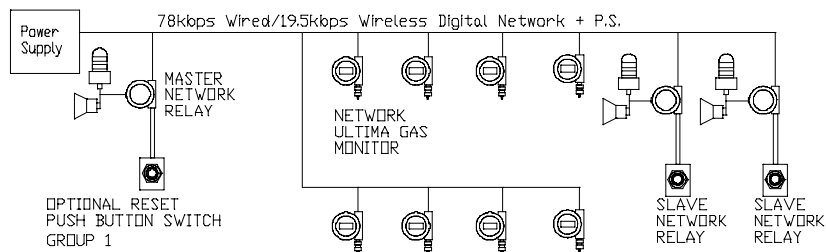


Figure 4-1. Typical Basic Group System for Auto-configured Units

Basic Stand-alone System

The most basic stand-alone system is made up of a number of Ultima Gas Monitors and a master Network Ultima Relay Module.

- The master Network Ultima Relay Module contains all of that particular group's sensor information necessary to install the group in the Auto-configure Mode.

Multiple Relay Module System

The user can also create a group with multiple Network Ultima Relay Modules.

- The Master Network Ultima Relay Module also contains all of the "slave" Network Ultima Relay Module information necessary to install the group in the Auto-configure Mode.
- Each Network Ultima Gas Monitor in a stand-alone system can be set for up to three levels of alarms.
- Each Network Ultima Relay Module is made up of:
 - three alarm relays
 - one fault relay that:
 - is normally energized
 - de-energizes if the sensors do not update their status within the time limit.
- Each Alarm Relay can be logically connected to (and driven by) up to eight Network Ultima Gas Monitors
- Any alarm on any Network Ultima Gas Monitor can energize or drive the Network Ultima Relay Module.

Sub-Systems

Sub-Systems are made up of several Network Ultima Gas Monitors networked together and control several Network Ultima Relay units. The Network Ultima Gas Monitors can detect high gas readings and send an alarm to the Network Ultima Relay unit(s). When the user presses the alarm acknowledge push-button, the Network Ultima Relay Unit sends the alarm acknowledge to all Network Ultima Gas Monitors in the group.

An Auto-configured Multiple Group system can include up to five groups (five masters) (See FIGURE 4-2 for an example of a typical three-group system).

When multiple groups are connected in one wired network, the user can move one Network Ultima Gas Monitor or slave

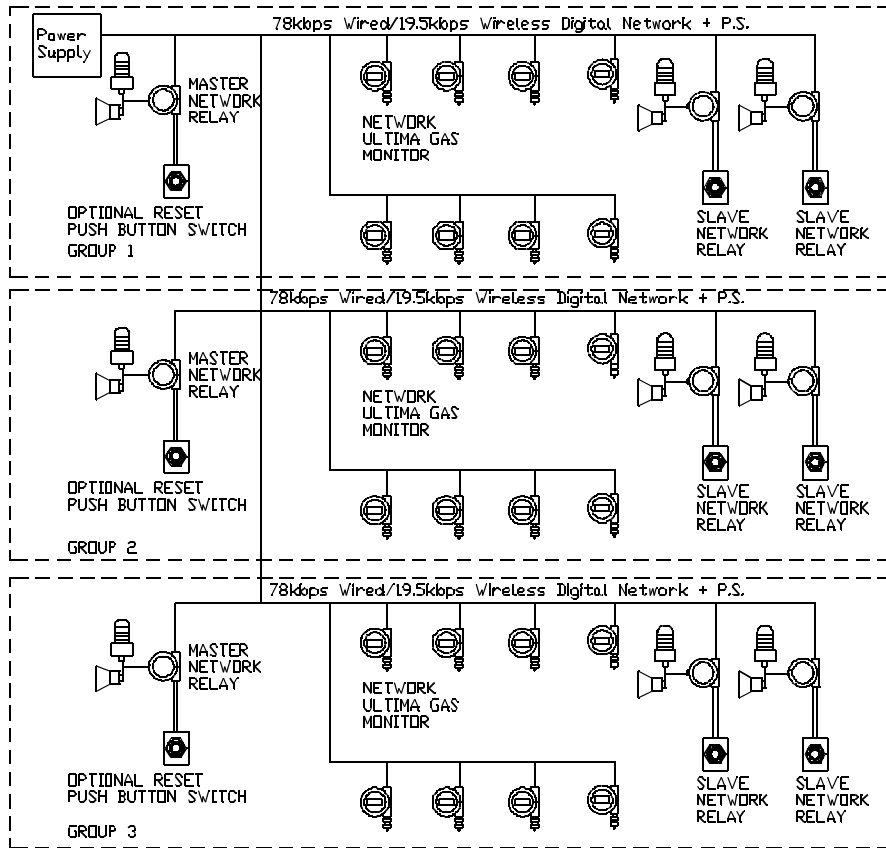


Figure 4-2. Typical Multiple Group System for Auto-configured Units

Network Ultima Relay Module to a different group without disconnecting the unit.

- The Master Relay remains within its group and cannot be moved to a different group.
- To remove a member from the group, the Network Ultima Master Relay must be initialized and the group re-configured without that particular member (see "Initializing the Master Network Ultima Relay" later in this Chapter).

Configuring the Network Ultima Relay

A Minimum Configuration Consists of:

- one Master Network Ultima Relay
- one Network Ultima Gas Monitor.

A Maximum Configuration Consists of:

- five different Groups with:
 - eight Wired Relays/three Wireless Relays (one is designated as the Master Relay)
 - eight Sensors
- a sixth Group
 - designated as a "parking lot"
 - consisting of non-configured Network Ultima Relay and/or Network Ultima Gas Monitor units).

Configuring the Network Ultima Relay requires the use of three buttons on the Ultima Controller or Ultima Calibrator:

1. **CAL** button
 - Press three times to enter or exit the Auto Configuration mode.
2. **ADDRESS** button
 - Once user has placed the Master Relay in the Auto Configuration mode:
 - Use this button to send address information from the Network Ultima Gas Monitor or Slave Network Ultima Relay module intended to be configured as a Group member.
3. **ZERO** button
 - Use this button to acknowledge alarms at the Network Ultima Relay.

NOTE: Network Relays are factory-set with the Auto-configure feature enabled (Local Mode). The user can switch the Network Ultima Relays from the Local mode to the External mode by using a PC; see Chapter 5 for more information on the Data Center System.

To Create Group Number One

1. **Assign a Master Network Relay:**

- a. Point the Controller or Calibrator at the Ultima Network Relay.
- b. Press the CAL button three times to place the Network Ultima Relay in the Auto-configure mode.
 - The yellow STATUS LED on the Relay:
 - flashes if it has no Members or
 - remains ON if it has at least one Member assigned to its Group.
 - If there is no response, it is a Slave Network Ultima Relay.

NOTE: If the Master Relay receives no input within 30 minutes, it leaves auto-configure mode.

2. **Add a Network Ultima Gas Monitor to Group Number One:**

- a. Point the Controller or Calibrator at the first Network Ultima Gas Monitor.
- b. Press the ADDRESS button:
 - Network Ultima Gas Monitor sends address information to the Master Network Ultima Relay.
 - Green STATUS LED on Master Network Ultima Relay flickers once if it received address information from the first Sensor.
 - Master Network Ultima Relay assigns that Network Ultima Gas Monitor as Member One of Group One.
 - All LCD segments of the Member One, Group One Sensor turn ON to show that Network Ultima Gas Monitor is:
 - installed in that Group
 - reporting to that Master.
 - Network Ultima Gas Monitor goes through a normal power-up sequence.
 - A three-digit address displays on the Network Ultima Gas Monitor:

The first digit indicates the type of unit:

- 1 = Network Ultima Gas Monitor
- 2 = Relay Module

The second digit indicates the Member Number:

- 1 = first member of Group
- 2 = second member of Group, etc.

The third digit is the Group Number (Wired units):

- 1 = first Group
- 2 = second Group, etc.

After Sensor Number One is installed as a Member, the address is:

- **111** = This is a **Network Ultima Gas Monitor**. This is the **first Network Ultima Gas Monitor** of the Group. This is the first Network Ultima Gas Monitor of **Group One**.
- c. Once the first Network Ultima Gas Monitor displays all LCD segments, configure Network Ultima Gas Monitor number two by repeating step 2.
- After Sensor number two is installed as a Member, the address is:
 - **121** = This is a **Network Ultima Gas Monitor**. This is the **second Network Ultima Gas Monitor** of the Group (Wired units). This is the second Network Ultima Gas Monitor of Group One.
- d. Repeat this procedure for each Network Ultima Gas Monitor to be installed in the Group.
3. **Assign a Slave Network Ultima Relay Module to Group One:**
- a. Point the Controller or Calibrator at the desired Network Ultima Relay
 - b. Press the ADDRESS button.
 - All Network Ultima Relay LEDs flash twice to indicate that a particular Network Ultima Relay Module is installed.
 - It is now a Slave Network Ultima Relay Module.
4. **Remove the Master Relay from the Auto Configuration Mode:**
- a. Point the Controller or Calibrator at the Master Network Ultima Relay.

- b. Press the CAL button three times.

NOTE: For normal operation, always remove the Master Network Ultima Relay from the Auto-configuration Mode.

5. **Verify that all sensors are installed:**

- a. Disconnect any equipment attached to the Network Ultima Relay contacts.

⚠ CAUTION

If relays are wired to external devices (e.g., horns, exhaust fans, etc.) These devices may activate during initial start-up procedures. User may desire to test external devices or prevent activation by disconnecting all equipment from relay contacts and reconnecting when start-up is completed.

- b. Apply span gas to exceed the default threshold.
- c. Observe the Network Ultima Gas Monitor LCD.
 - The 1, 2 and/or 3 Alarm Flag(s) display.
- d. Observe the Network Ultima Relay Module.
 - The corresponding 1, 2 and/or 3 Alarm(s) displays.
- e. If these Alarm Flags do not display, repeat the entire Auto Configuration procedure for that sensor.
- f. Turn OFF the span gas.

To Create Group Number Two on a Wired System:

Repeat procedures given under "To Create Group Number One."

- The second Master Network Ultima Relay Module will detect the existence of the Master Network Ultima Relay of Group One or other groups on the network and assign itself as Master of Group Number Two, or another unused Group Number.

NOTE: For proper operation, only one Master Network Ultima Relay Module can be placed in Auto-configure Mode at any one time on the network.

To Create Group Number Two on a Wireless System:

1. Remove power from the unit.
2. Unscrew the Network Ultima Relay Module cover and set it aside.

3. Using a small screwdriver, set the switches on the bottom printed circuit board to the desired channel as shown in TABLE 4-1.
 - The switches are accessible without any disassembly of the unit.

Table 4-1. Wireless Unit Channel Selection			
SW-1	SW-2	SW-3	CHANNEL #
OFF	OFF	OFF	0
ON	OFF	OFF	1
OFF	ON	OFF	2
ON	ON	OFF	3
OFF	OFF	ON	4
ON	OFF	ON	5
OFF	ON	ON	6
ON	ON	ON	INVALID

4. Re-install the Network Ultima Relay Module cover.
5. Reconnect power to the unit.
NOTE: Power must be cycled to activate the changes.
6. Label the unit with channel selected.
7. Repeat the same procedure for all displays, relays, and sensors to be bound as a Network.
8. Repeat the procedures given under "To Create Group Number One".

Initializing the Master Network Ultima Relay

The Master Network Ultima Relay must be initialized when the following conditions occur:

- One or more members in the group are removed from operation.
- The Master Network Ultima Relay and its group members are removed and re-assigned to different group(s) on the network.

Using the SEND ID Push-button

To initialize the Master Network Ultima Relay and its group members by using the SEND ID push-button:

1. Turn OFF power to the Master Network Ultima Relay unit.
2. Hold down the SEND ID push-button while turning ON the power; release the SEND ID push-button when the Network Ultima Relay unit starts flashing all LEDs for several seconds.

NOTE: If the Master Network Relay unit was previously configured with members, it will try to communicate and initialize the members, before clearing its internal configuration information.

Using the Ultima Controller or the Ultima Calibrator

To initialize the Master Network Ultima Relay and its group members in a non-intrusive way, the Ultima Controller or the Ultima Calibrator can be used as follows:

1. Point the Ultima Controller or Ultima Calibrator at the Master Network Ultima Relay unit and press the CAL button three times to enter the Auto-configuration mode.
2. Press the ZERO button (marked "ZERO") five times.
 - The Master Network Ultima Relay unit flashes all LEDs for several seconds.

NOTE: If the Master Network Relay unit was previously configured with members, it will try to communicate and initialize the members, before clearing its internal configuration information.

NOTE: The non-configured Network Ultima Gas Monitor units are placed in the Group 6 parking lot.

- This is shown on the LCD when their addresses are displayed as "116."
- These units will no longer send their alarm status to the Network Ultima Relay units; therefore, no relay will be activated.

Replacing a Non-functioning Unit in a Group

To replace a non-functioning Network Ultima Gas Monitor or Slave Network Ultima Relay unit in a group:

1. Remove the failed unit from the network.

Chapter 4, Auto-Configured Units

2. Allow the Master Network Ultima Relay unit to detect the loss of communication with the removed unit.
 - This may take up to three minutes and 20 seconds.
3. Mount the replacement unit on the network.
4. Perform the complete "To Create Group Number One" procedure given earlier in this chapter.

NOTE: The Master Network Ultima Relay unit keeps track of the address of the failed unit and assigns the same address to the replacement unit.

Chapter 5

Data Center Configured Units (Wired Units Only)

Start-up

Applying Power

1. Apply power.
 - Verify power by observing that all LEDs turn ON momentarily.
 - Only the STATUS LED continues to intermittently flash.
2. Verify proper system operation by activating the alarm points on the Network Ultima Gas Monitors.

General

This chapter provides a more in-depth description of network operation and setup of the Network Ultima Relay.

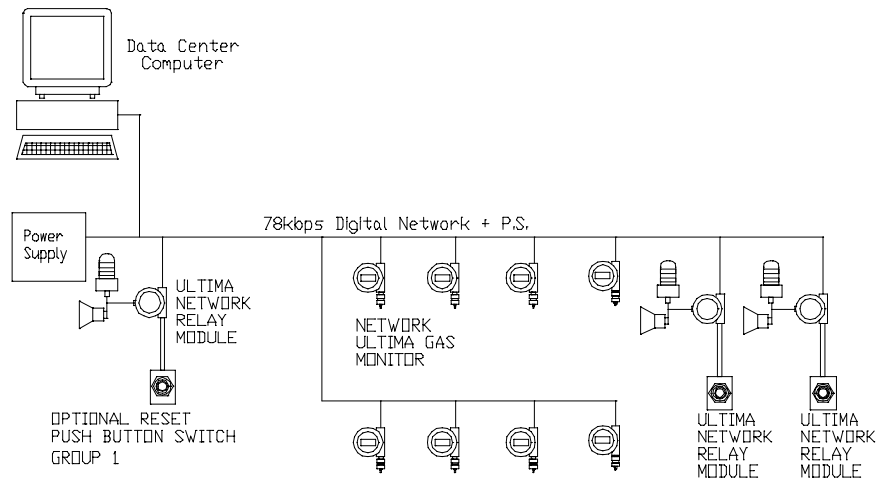


Figure 5-1. Typical Basic Group System for Data Center Configured Units

Chapter 5, Data Center Configured Units

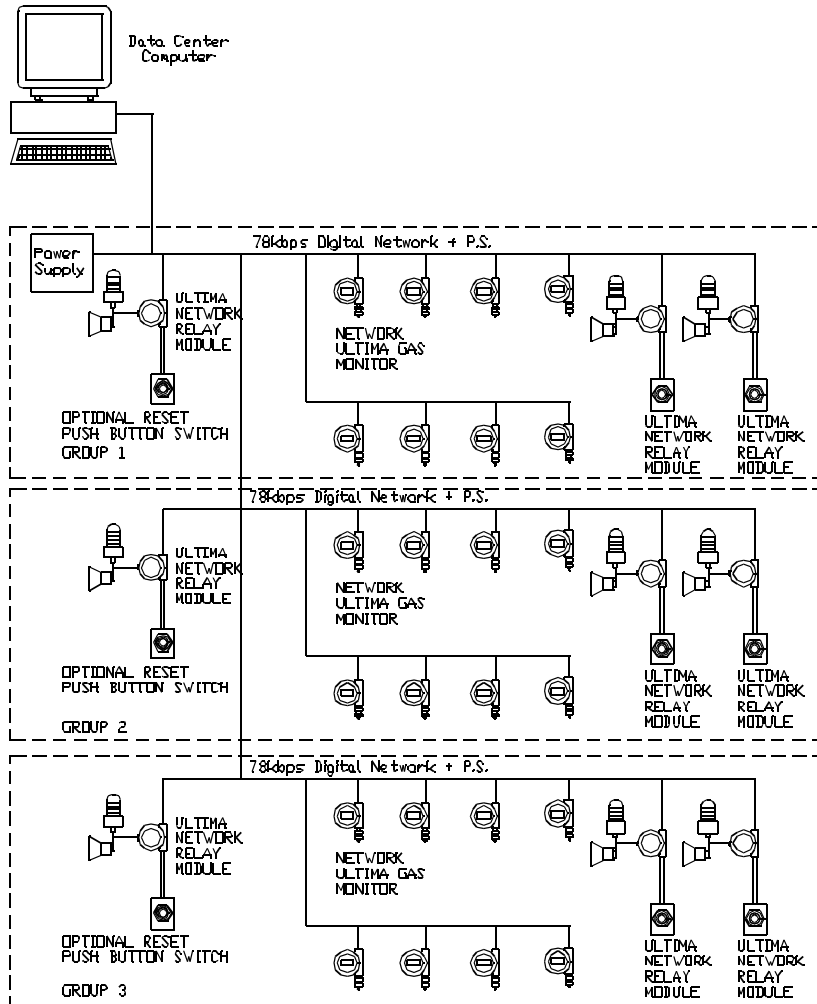


Figure 5-2. Typical Multiple Group System for Data Center Configured Units

Initial Configuration Setting

- The Network Ultima Relay Module is factory-set with the Auto-Configure feature enabled.

- The configuration network variable **nciNetConfig** is factory-set to the value **CFG_LOCAL (0)** to enable this feature.
- The variable is tested on power-up.
- If the Network Ultima Relay Module is to be installed for Data Center applications:
 - PC-based network management tool software (such as MetraVision or LonMaker) must be used
 - The variable, **nciNetConfig**, must be set to the value **CFG_EXTERNAL (1)** during installation. This setting is stored in non-volatile memory to prevent the Auto-Configure feature from overriding the unit's externally-specified configuration each time it is reset.

Types of Variables

- Alarm status and feedback are output-type only.
- Time-setting variable is an input for setting via the network.
- Object (Type 0) Variables control the network interface for the Network Ultima Relay.
- All variables, including configuration, output and network-specific variables can be changed by a computer, if necessary.

Network Ultima Relay Network Variables

All variables can be polled, and those labeled as inputs can be written by the network. Per Inter-operability Guidelines, the network interface incorporates:

- Mandatory Node Object Variables
- Mandatory Closed Loop Actuator Object Variables

All variables are associated with one of these two objects and are classified as either:

- configuration type variables or
- non-configuration type variables.

Node Object (Type 0) Variables

The network can monitor these functions within the node.

For initial implementation of the Network Ultima Relay, only mandatory variables and certain optional variables must be configured.

Unsupported status bits are to be marked in the status mask as described in the following:

Table 5-1. Object (Type 0) Variables			
NV INDEX	VARIABLE NAME	FORMAT	COMMENTS
9	nviRequest	SNVT_obj_request	Used to request object modes
			Only RQ_NORMAL, RQ_UPDATE_STATUS and RQ_REPORT_MASK supported.
10	nvoStatus	SNVT_obj_status	Used to indicate status of various node objects.
14	nciNetConfig	SNVT_config_src	Installation mode. Auto-configure feature is enabled when equal to CFG_LOCAL (0). Must be set to CFG_EXTERNAL (1) when used with PC. Factory default = CFG_LOCAL (0)
11	nciMaxStsSendT	SNVT_elapsed_tm	Maximum send time for nvoStatus that can be used for heartbeat. Factory default = 0

Variable #1 - nviRequest

This input structure (SNVT #92) to the node is used to request a mode for an object within the node.

Valid requests include:

- an ID to identify the object
- a mode command.

Valid mode commands for the node object are:

- **RQ_NORMAL** to enable the object and report object status
- **RQ_UPDATE_STATUS** to report object status only
- **RQ_REPORT_MASK** to report the supported bits in the object status variable structure.

Unsupported requests to the node return:

invalid_request status.

Variable #2 - nvoStatus

This structure (SNVT #93) is used to report the status for any object on a node. A report mask request causes this variable to be output with a mask indicating which bits that are valid in the object status structure.

Valid bits in the Node Object (type 0) Status for the node object are:

- invalid_id and invalid_request bits (mandatory)
- open_circuit (no response)
- out_of_service (nak, busy)
- comm_failure (network).

All other bits are disabled for the node object.

Variable #3 - nciNetConfig

This input configuration variable (SNVT #69) to the node is used to determine if the node will be self-installing or installed with an external network manager.

- Must be set to **CFG_EXTERNAL**.

Variable #4 - nciMaxStsSendT

This configuration property is used to control the maximum time period that expires before the node automatically transmits the current value of the nvoStatus output network variable. This provides a heartbeat output to indicate the node is still healthy. The status of each object in the node is returned sequentially in round-robin fashion (one object status per expiration of the timer).

- This output may be disabled by setting all fields to zero.
- Default value is 0.

Closed Loop Actuator Object (Type 4) Variables

These variables supply Network Ultima Relay status information to the network. Additional information for the actuator object may be obtained by an nviRequest for object ID #4. Valid requests for the Closed Loop Actuator object are:

- RQ_NORMAL
- RQ_UPDATE_STATUS
- RQ_REPORT_MASK

- RQ_OVERRIDE
- RQ_RMV_OVERRIDE.

A report mask request causes the nvoStatus variable to be output with a mask indicating which bits are valid in the Closed Loop Actuator Object Status structure. Valid bits in the Ultima Relay Object Status are:

- invalid_id and invalid_request bits (mandatory).

All other bits are disabled.

Table 5-2. Closed Loop Actuator Object (Type 4)				
NV INDEX	VARIABLE NAME	FORMAT	SEE NOTE	COMMENTS
1-3	nviAlarm[3]	SNVT_lev_disc	1	Up to 8 inputs can be grouped and bound to each variable, forming an OR function. In override mode, the states of these variables are assigned by Data Center as the override states of their corresponding relays.
4	nvoAlarmState[3]	SNVT_lev_disc		Reflect the outputs of the OR functions of nviAlarm[x]. Logically drive the corresponding alarm relays and LEDs. ST_OFF (0) = normal ST_ON (4) = alarm
18-20	nvoActPosFb[3]	SNVT_lev_disc		Feedback states of the alarm relay contacts. ST_OFF (0) = open ST_ON (4) = closed
7	nviTrouble	SNVT_lev_disc		For manual override of the Fault relay. Fault Detect function must be disabled prior to using manual override (nciMaxRecT = zeroes). ST_OFF (0) = de-energized (fault) ST_ON (4) = energized (normal)
8	nvoTroubleFb	SNVT_lev_disc		Feedback state of the Fault relay. nciMaxSendT enables its use as heartbeat. ST_OFF (0) = de-energized (fault) ST_ON (4) = energized (normal)
12	nciMaxSendT	SNVT_elapsed_tm		Maximum send time for nvoTroubleFb that can be used as heartbeat. Default = 1 minute.

Table 5-2. Closed Loop Actuator Object (Type 4)				
NV INDEX	VARIABLE NAME	FORMAT	SEE NOTE	COMMENTS
13	nciMinSendT	SNVT_elapsed_tm		Minimum send time between transmissions of network variables. Default = 100 milliseconds for Wired Units, 5 seconds for Wireless Units
15	nciMaxRecT	SNVT_elapsed_tm		Maximum time between receiving updates of nviAlarm[] before causing the Fault condition. Set to zeroes to disable the Fault Detect function. Default = 3 minutes, 20 seconds.
0	nvoAlmAck	SNVT_lev_disc	2	Feedback state of nviAlmReset and/or the push-button, indicating the alarm acknowledge command has been received. It reverts back to default after 5 seconds. ST_OFF (0) = default ST_ON (4) = acknowledged
38	nviAlmReset	SNVT_lev_disc	2	Alarm acknowledge input to reset the Fault relay and all Alarm relays. ST_OFF (0) = default ST_ON (4) = acknowledge
21-24	nviGate1[4]	SNVT_lev_disc		Input network variables to form AND logic gates. Default = ST_ON (4)
33	nvoAND1	SNVT_lev_disc		Output of the AND logic gate nviGate1[]. Default = ST_ON (4)
25-28	nviGate2[4]	SNVT_lev_disc		Input network variables to form AND logic gates. Default = ST_ON (4)
34	nvoAND2	SNVT_lev_disc		Output of the AND logic gate nviGate2[]. Default = ST_ON (4)
29-32	nviGate3[4]	SNVT_lev_disc		Input network variables to form AND logic gates. Default = ST_ON (4)
35	nvoAND3	SNVT_lev_disc		Output of the AND logic gate nviGate3[]. Default = ST_ON (4)
36	nvoGroupSize	SNVT_count		The total number of nodes bound to nviAlarm[]

Table 5-2. Closed Loop Actuator Object (Type 4)				
NV INDEX	VARIABLE NAME	FORMAT	SEE NOTE	COMMENTS
37	nvoGroupNumber	SNVT_count		For Local Mode only. Valid value is 1 .. 5. Default = 0
16-17	nciNumNodes[2]	SNVT_char_ascii	4	nciNumNodes[1] represents the total number of sensors bound and polled, in External mode; nciNumNodes[0] is reserved for Local mode use only
39	nciAlarmModes	SNVT_state	3	bit 0 disable acknowledgment to relay 1 bit 1 disable acknowledgment to relay 2 bit 2 disable acknowledgment to relay 3 bit 3 disable initial reset to relay 1 bit 4 disable initial reset to relay 2 bit 5 disable initial reset to relay 3 bit 6 initial reset value for relay 1 bit 7 initial reset value for relay 2 bit 8 initial reset value for relay 3 bit 9-14 reserved bit 15 enable active polling (external mode)
39	nciPollIT	SNVT_elapsed_tm	3	time interval between polling (in seconds), if enabled. Default = 2 seconds for Wired Units, 10 seconds for Wireless Units
39	nviOpStatus	op_status_t	1	Used to bind variable nv_op_status from Ultima with Digital Output Gas Monitor. Only nv_op_status.error bit is monitored

Restrictions and Rules

Note 1: Mandatory bound Network Variables from Network Ultima Gas Monitor

For the Network Ultima Relay (NUR) module to properly operate its relays and LED status, the module must contain the variable binding from each of the Network Ultima Gas Monitor (NUGM) modules. (See TABLE 5-3):

Table 5-3. Mandatory, Fully Bound Network Variables from the Network Ultima Gas Monitor			
HUB (SOURCES)		TARGET (DESTINATION)	
DEVICE	NV	DEVICE	NV
NUGMs (S1...S8)	nv_alarm_state_1	NUR	nviAlarm[0]
NUGMs (S1...S8)	nv_alarm_state_2	NUR	nviAlarm[1]
NUGMs (S1...S8)	nv_alarm_state_3	NUR	nviAlarm[2]
NUGMs (S1...S8)	nv_op_status	NUR	nviOpStatus

Up to eight Network Ultima Gas Monitor modules can be bound fully to the Network Ultima Relay module using the binding mapping as described in TABLE 5-3.

- In this configuration, the alarm states 1, 2, and 3 of the Network Ultima Gas Monitor will drive the corresponding relays 1, 2, and 3 on the Network Ultima Relay module.
- Any error status that may be generated at the Network Ultima Gas Monitor will also be monitored as a fault condition at the Network Ultima Relay module.
- Certain application may require only one alarm level from each Network Ultima Gas Monitor module to be monitored by one central Network Ultima Relay module. It allows up to twenty-four Network Ultima Gas Monitor modules to be tied to one Network Ultima Relay module (See TABLE 5-4):

Table 5-4. Mandatory, Minimally Bound Network Variables from the Network Ultima Gas Monitor			
HUB (SOURCES)		TARGET (DESTINATION)	
DEVICE	NV	DEVICE	NV
NUGMs (S1...S8)	nv_alarm_state_1	NUR	nviAlarm[0]
NUGMs (S9...S16)	nv_alarm_state_1	NUR	nviAlarm[1]
NUGMs (S17...S24)	nv_alarm_state_1	NUR	nviAlarm[2]
NUGMs (S1...S24)	nv_op_status	NUR	nviOpStatus

NOTE: The total number of Network Ultima Gas Monitor modules that are bound to the Network Ultima Relay module must be programmed and stored in the non-volatile configuration network variable nciNumNodes[1].

Note 2: Optional bound Variables

Four Network Ultima Relay (NUR)'s network variables:

- nviAlmReset
- nvoAlmAck
- nvoActPosFb and
- nvoTroubleFb

may be bound to Network Ultima Gas Monitor (NUGM), Network Ultima Relay, and/or Network Ultima Display (NUD) modules, depending on the application requirements. TABLE 5-5 describes the use of bound variables between various devices.

Table 5-5. Optional Bound Variables				
HUB (SOURCES)		TARGET DESTINATION		PURPOSE
DEVICE	NV	DEVICE	NV	
NUR	nvoAlmAck	NUGM	nviAlmAck	Allows user to acknowledge remote Network Ultima Gas Monitor's latched alarm(s) by using the Controller or the Calibrator, or by pressing the Alarm Reset pushbutton at the Network Ultima Relay location. NOTE: This setup cannot be used with the acknowledge disable feature
NUR	nvoAlmAck	NUD	nviAlmReset	Allows user to reset remote Network Display module's alarming, locked screen by using the Controller or the Calibrator, or by pressing the Alarm reset pushbutton at the Network Ultima Relay location
NUR	nvoAlmAck	NUR	nviAlmReset	Allows user to reset remote Network Relay module's alarms by using the Controller or the Calibrator, or by pressing the Alarm reset pushbutton at the Network Ultima Relay location
NUR	nvoActPosFb	NUR	nviAlarm[x]	Network Ultima Relay monitors cascaded Network Ultima Relays' alarm conditions and activates its relay when an alarm condition occurs
NUR	nvoTroubleFb	NUR	nviAlarm[x]	Network Ultima Relay monitors cascaded Network Ultima Relays' fault conditions and activates its relay when a fault condition occurs

Note 3: Optional Polling Feature

- By default, if the Network Ultima Relay module detects missing heartbeats from the Network Ultima Gas Monitor modules. After a period of time (as set by nciMaxRecT variable), it will generate a fault condition.
- In addition to heartbeat detect, the Network Ultima Relay module may also be configured to actively poll the Network Ultima Gas Monitor modules in order to detect a loss of communication. Network variables nciAlarmModes (bit 15) and nciPollT must be set accordingly to enable this polling feature.

⚠ WARNING

The collective number of the active polling devices in the system create a considerable amount of additional network traffic, which may cause unforeseeable detrimental effect to the performance of the system as a whole in detecting critical alarm conditions. As a general rule, no more than three (3) active polling devices are allowed in a system or in each sub-system group of a multi-group system. Extra care, thorough fine-tuning and functional verification of the network system performance must be performed by a qualified network application engineer, should additional active polling devices be required in the system. Failure to comply with this warning can result in interruption of signal.

Note 4: Mandatory Assignment of nciNumNodes[1]

- For an External mode operation, the configuration network variable nciNumNodes[1] must be set to a non-zero integer number, equal to the total number of the Network Ultima Gas Monitor modules that are bound to (and polled by) the Network Ultima Relay.
- If the value is left at zero or set to a number smaller than the actual total number of bound Network Gas Monitor units, the Network Relay will use its internal counter to detect failed units.
- As a backup, this RAM-based counter is maintained and incremented during runtime solely based on the total number of the unique addresses of the Network Ultima Gas Monitor units that the Network Relay receives.
- The Network Relay, with its heartbeat detection scheme, will then be able to detect a failed NUGM unit based on the larger value of the two variables, provided that ALL units successfully send their initial alarm states after power-up.
- On the other hand, if these bound NUGM units that are not accounted for in nciNumNodes[1] value shall fail and not send any messages since the initial power-up of the Network Relay, the Network Relay will not be able to detect them as missing and failed units. Thus it is critical to set the nciNumNodes[1] value, accordingly.

Chapter 6 Start-up

General Description

- Once the relays within the Ultima Relay Module are configured, they activate when an alarm condition is detected at the Ultima Gas Monitor.
- Each relay can be logically connected and driven by up to eight alarm conditions, forming a logical OR function. This means:
 - Any alarm condition connected to the relay will activate the alarm relay
 - All alarm conditions connected to the relay must clear to de-activate the alarm relay.
- Similarly, the Fault relay de-energizes when a fault condition is detected.
- The Fault relay is configured as normally energized.
 - This is common practice to ensure the relay de-activates into a fail-safe condition if a fault or power outage occurs.

Front Panel Description

The front panel is shown in FIGURE 6-1.

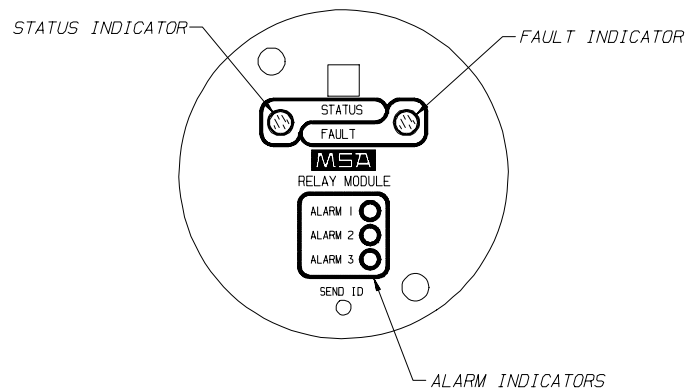


Figure 6-1.
Front Panel

Status Indicator

- During normal operation, the green Status Indicator flashes to indicate communication between the Network Ultima Gas Monitor and the Network Ultima Relay Module.
 - If this flashing does not occur, refer to the Chapter 8, Maintenance "Troubleshooting Guidelines" for possible solutions.

Fault Indicator

- Depending on the particular fault detected, the Fault Indicator:
 - remains ON or
 - flashes.

YELLOW Fault Indicator STEADY ON indicates:

- communication loss (for longer than three minutes) between:
 - the Network Ultima Relay Module and
 - the Ultima Gas Monitor *or*
- improper Network Ultima sensor connection *or*
- Network Ultima Gas Monitor internal fault *or*
- inoperative relay.

YELLOW Fault Indicator FLASHING indicates:

- fault condition is acknowledged
- fault relay is reset.

RED Fault Indicator STEADY ON or FLASHING indicates:

- internal memory problem
- unconfigured unit
- inoperative unit.

Alarms 1, 2, 3

- These LEDs turn STEADY ON:
 - when the Ultima Gas Monitor detects an alarm condition
 - and remain on as long as the gas condition exceeds the value set within the Ultima Gas Monitor.
- Depending on the relay latch mode of the Ultima Gas Monitor, the indicators may remain ON or turn OFF when the gas condition abates.

- These LEDs flash when alarm relays do not match the intended alarm state.

Clearing Alarms

In the event of an alarm:

- the corresponding alarm relay contact (SPST) on the Network Ultima Relay is set to its closed position
- the relay contact opens when the alarm clears or the user issues an acknowledge command.

The three alarm relays are simultaneously reset when an acknowledge command is issued in one of three ways:

- via the Ultima Controller
- via the Ultima Calibrator
- via an optionally-installed push-button.

The ZERO buttons on the Ultima Controller and Ultima Calibrator provide the acknowledge command function. Point the Ultima Controller or Ultima Calibrator at the Network Relay to reset the alarm(s).

By default, if the alarm has been acknowledged and the alarm condition still exists:

- its relay contact will stay open
- the alarm LED indicator will be flashing.

As an option, any of the relays on the Network Ultima Relay can be configured so:

- they are isolated from the alarm acknowledge command but
- the remainder of the relays are acknowledgeable.

While the alarm relay is "acknowledge disabled," the relay contact will be closed on alarm and stay in its closed position until the alarm condition clears, causing the contact to open.

The Acknowledge command will:

- not reset the relay position of that relay
- only reset the remaining relays that are not "acknowledge disabled."

The bit 0, 1, or 2 of the configuration network variable `nciAlarmModes` must be set to 1 to disable acknowledgment to the corresponding alarm relay(s).

Chapter 6, Start-up

- Factory default value is 0.

The relays on Network Relay are latching-type relays which retain their last contact positions, even without power.

Bits 6 through 8 of the configuration network variable `nciAlarmModes` control the initial reset values for the relays.

- Factory default values are 0, corresponding to open relay contact positions.
- The value must be set to 1 if a forced, closed relay contact position is desired after each initial power-up or hardware reset.

Bits 3 through 5 disable the initial reset setting, leaving the relay contact position(s) unchanged on initial power or hardware reset.

Chapter 7

Specifications

Table 7-1. Performance Specifications		
TEMPERATURE RANGE	-20 to +50°C (-4 to +122°F)	
HUMIDITY	15 to 95% RH, non-condensing	
HAZARDOUS AREA RATING	EXPLOSION-PROOF MODELS	Class I, Div. 1, Groups B, C & D
POWER INPUT	7-30 VDC (Wired Units)	160 mA at 7 VDC
		35 mA at 30 VDC
	7-30 VDC (Wireless Units)	210 mA at 7 VDC
		80 mA at 24 VDC
RELAYS	ALARMS (3 TOTAL, 1 PER ALARM)	SPST (Single pole, single throw)
	FAULT (NORMALLY ENERGIZED)	SPDT (Single pole, double throw)
RELAY RATINGS	AT 110 VOLTS AC NON-INDUCTIVE	5 Amps
	AT 30 VOLTS DC, NON-INDUCTIVE	5 Amps
PHYSICAL	SIZE - (Wired Units)	9 x 6 x 5 inches (228.5 x 152.4 x 127 cm)
	SIZE - (Wireless Units)	13.062" long x 5.750" wide x 5.375" high (331.77 mm x 146.05 mm x 136.525 mm)
	WEIGHT- (Wired Units)	4.5 pounds (2.041 kilograms)
	WEIGHT- (Wireless Units)	9.14 lbs. (4.15 kilograms)

Chapter 8 Maintenance

Under normal operating conditions, the Ultima Relay Module requires no maintenance. However, periodical testing of the relays may be done to ensure that complete system operation is possible.

Troubleshooting Guidelines

SYMPTOMS	POSSIBLE CAUSES	CORRECTIVE ACTION
Alarms do not activate	Ultima alarms not enabled or communication lost	1. Enable alarms at the Network Ultima Gas Monitor
		2. Check wiring
		3. Check power supply
		4. Check antenna location
No communication between the relay module and Ultima Gas Monitor	Faulty wiring or lack of power	1. Check wiring between the Network Ultima Gas Monitor and the Network Ultima Relay Module
		2. Check power wiring or power supply
		3. Check wiring within the Network Ultima Relay Module
		4. Check antenna location
YELLOW FAULT ON	Communication lost	1. Check network communication
		2. Check antenna location
RED FAULT Steady ON	Memory interrupted	1. Consult factory
RED FAULT Flashing	Improper configuration	1. Reconfigure unit
YELLOW STATUS steady ON or flashing	Stuck in Auto-Configure mode	1. Check the RESET push-button switch. It may be shorted. (applicable to Local mode only)
	RESET push-button switch may be shorted	
RED FAULT flashing	Improper configuration	1. If set for External mode, reconfigure unit using a PC
		2. If set for Local mode, consult factory
Error condition(s) at the Network Ultima Gas Monitor does not generate FAULT condition at the Network Relay	Incomplete binding. NviOpStatus network variable is not bound properly	1. Check binding parameters using a PC (applicable to External mode only)

Obtaining Replacement Parts

To obtain replacement parts, address the order or inquiry to:

Mine Safety Appliances Company
Instrument Division
P.O. Box 427, Pittsburgh, PA 15230-0427

or call toll-free: **1-800-MSA-INST**

Table 8-1. Replacement Parts	
PART	PART NO.
Processor (bottom) PC Board	710848
Relay (top) PC Board	710951
Wireless Unit Replacement Parts	
Antenna with Grip Kit	10046422
Printed Circuit Board Assembly, Lanworks INTFC Relay RF	10043292
Printed Circuit Board Assembly, Ultima Wireless with Modem	10041737

Ultima RF Module Antenna Replacement

1. Remove the cover from the stainless steel enclosure.
2. Remove two screws from the top printed circuit board assembly.
3. **Top Circuit Board(s) Removal**
NOTE: Note orientation of all printed circuit boards and connectors for proper re-assembly of unit.
 - a. **Sensor Module:**
The top two printed circuit boards are connected together and plugged into a third (termination) board; pull and remove all boards together.
 - b. **Display/Relay Module:**
Remove the top printed circuit board by unplugging it from the second (network) board

4. **Removing the Next Printed Circuit Board from the Mounting Plate:**
 - a. **Sensor Module:**

Remove the two mounting screws holding the termination board to the metal mounting plate; do not remove the metal standoffs from the termination board.
 - b. **Display/Relay Module:**

Remove the network board from the mounting plate by removing the two metal standoffs.
5. Unplug the antenna MMCX connector from the modem by pulling upwards.
6. Loosen the antenna grip and remove the antenna.
7. Replace the antenna grip with the new grip from the replacement kit.
8. Insert the new antenna into the grip and tighten with six inches of antenna extending from the grip.
9. Plug the antenna into the modem; be careful to route the antenna cable as shown in FIGURE 8-1.
10. Re-assemble the Termination/Network board to the mounting plate; be sure to plug in any connectors that were disconnected.
11. Re-assemble the top board assembly by plugging it in and fastening with the proper screws.

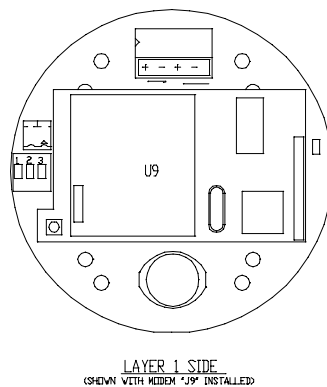


Figure 8-1.
Routing the Antenna Cable