



INSTRUMENTS

AirLink 7543 Gas Monitor Operator's Manual

Part Number: 71-0537

Revision: P2

Released: 8/2/21

Product Warranty

RKI Instruments, Inc. (Manufacturer) warrants its products to be free of defects in workmanship and materials—under normal use and service—for one year from the date of purchase from the manufacturer or from the product's authorized reseller.

The manufacturer is not liable (under this warranty) if its testing and examination disclose that the alleged defect in the product does not exist or was caused by the purchaser's (or any third party's) misuse, neglect, or improper installation, testing or calibrations. Any unauthorized attempt to repair or modify the product, or any other cause of damage beyond the range of the intended use, including damage by fire, lightning, water damage or other hazard, voids liability of the manufacturer.

Any repaired or replaced product or part has either a 90-day warranty or the remainder of the initial warranty period (whichever is longer).

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Chapter 1: Introduction

Overview

This chapter briefly describes the AirLink 7543 Gas Monitor. This chapter also describes the *AirLink 7543 Gas Monitor Operator's Manual* (this document). Table 1 at the end of this chapter lists the specifications for the AirLink 7543.

About the AirLink 7543 Gas Monitor

The AirLink 7543 can monitor up to 6 WireFree sensors. All configured channels are displayed every three seconds (scanned). When one channel indicates a gas reading, the monitor locks to that channel. If two or more channels are indicating a gas reading, the monitor scans those channels every three seconds. The user can manually scan channels by pressing *ADD* to move forward through channels or *SUB* to move backward through channels. The currently displayed channel will remain on the display for one minute and then the instrument will return to normal scanning.

There are three 5 Amp relays with 4 Amp fuses. The third relay may be configured as a Fault relay. This Fault relay will activate if any Fault is generated by the monitor or if any sensor that the monitor is configured to monitor goes into Fault. The Fault relay is removed from any further configurable options in Channel Setup—leaving only two relays for each channel. All relays can be configured to be either latching or auto resetting. The relays can be configured with different set points for alarm conditions for each channel, allowing each channel to have their own gas level set points.

An optional strobe and/or horn can be ordered. The strobe is installed on the top of the housing and is wired into the first relay. The horn is installed on the bottom of the housing and is wired into the second relay.

All relays have a 10% of value of hysteresis on the set points. This prevents the relays from rapidly switching on and off if gas readings are jumpy. Once the threshold value of a relay is reached, the relay is activated. However, the AirLink 7543 screen will not lock on the channel with a triggered relay while the reading is below the Relay Set Point (the user must scroll through the channels to find the channel with a triggered relay). When the gas reading decreases below the threshold value, the relay must be 90% of the initial threshold value to deactivate.

About this Manual

The *AirLink 7543 Gas Monitor Operator's Manual* uses the following conventions for notes, cautions, and warnings:

NOTE: Describes additional or critical information.

CAUTION: *Describes potential damage to equipment.*

WARNING: *Describes potential danger that can result in injury or death.*



Caution: refer to accompanying documentation

~ Vac (AC voltage)

— Vdc (DC voltage)

Specifications

Table 1 lists specifications for the AirLink 7543.

Table 1: AirLink 7543 Specifications

Description	Specification
Input Power	110/240 VAC or 12 - 35 VDC
Current Draw	275 mA max
Operating Temperature	-40°F to 158°F (-40°C to 70°C)
Input Signal	<ul style="list-style-type: none"> • Up to 6 WireFree sensor assemblies
Output	<ul style="list-style-type: none"> • RS-485 Modbus OR <ul style="list-style-type: none"> • WirelessHART
Construction (housing)	Fiberglass with clear window (NEMA 4)
Dimensions	20.8 in. H x 10.1 in. W x 4.6 in. D (52.8 cm H x 25.7 cm W x 11.7 cm D)
Weight	12.8 lbs.
Mounting	4 mounting feet (6" W x 10.2" T); 1/4" diameter max mounting bolt/screw size
User Controls	Program buttons: MENU, ADD, SUB
Display	Graphical LCD (128x64), transfective, sunlight readable, LED backlight
Relays	<ul style="list-style-type: none"> • 3 relays with 4A fuses • SPDT, Form C (common, normally open, and normally closed contacts)
Radio Options	<ul style="list-style-type: none"> • 2.4 GHz, ISM, 125 mW OR <ul style="list-style-type: none"> • 900 MHz, 200 mW
Standard Accessory	<ul style="list-style-type: none"> • Operator's manual (this document) • Magnetic wand
Optional Accessories	<ul style="list-style-type: none"> • Strobe • Horn

Chapter 2: Description

Front Panel

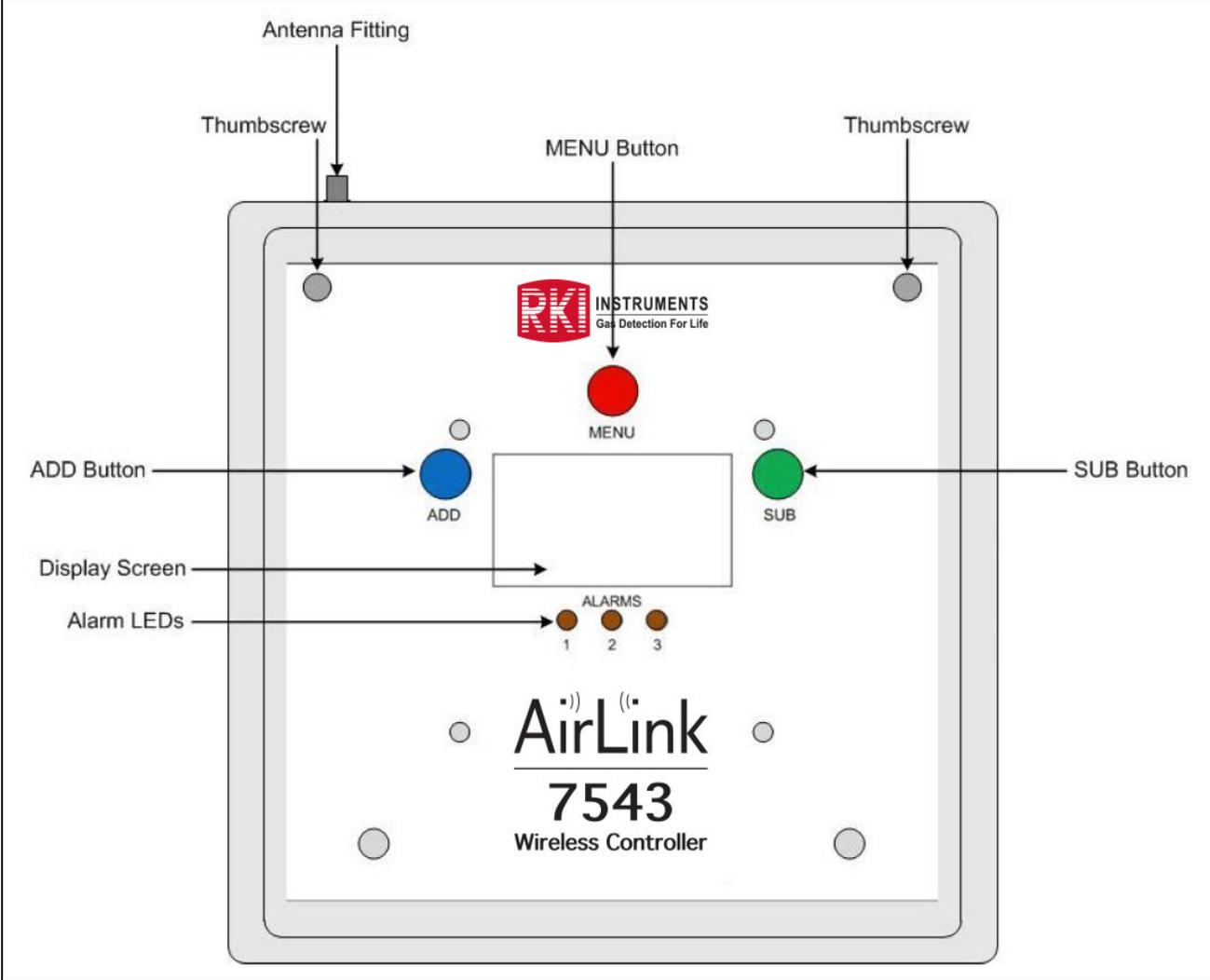


Figure 1: Front Panel

Terminal Board

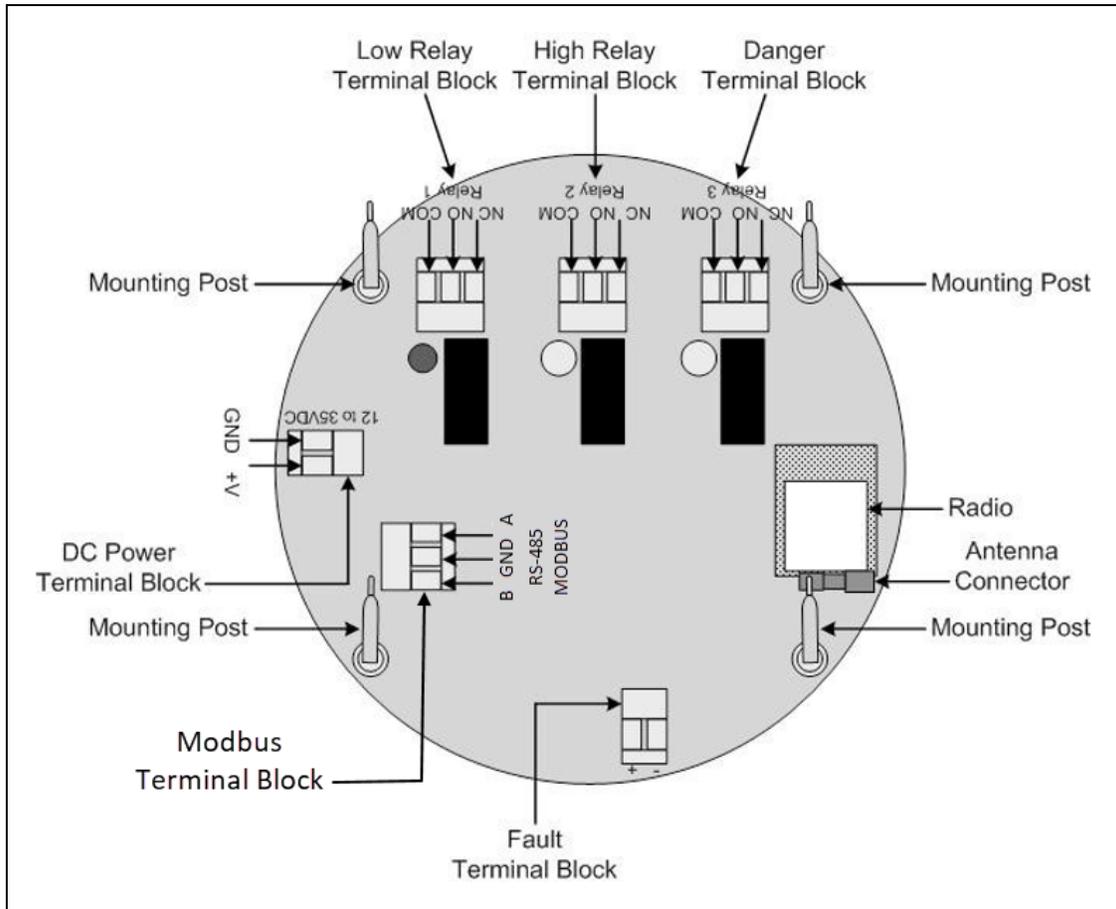


Figure 2: Terminal Board

Internal Components

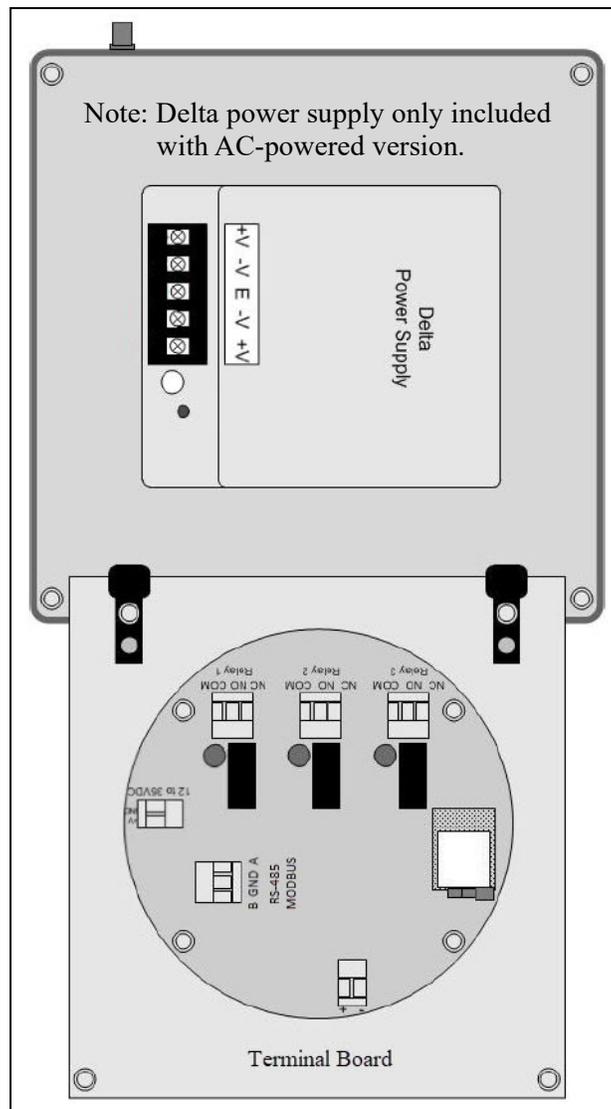


Figure 3: Internal Components

Chapter 3: Installation

Mounting the AirLink 7543 Gas Monitor

1. Select the mounting site. When you select the mounting site, consider the following factors:
 - Is an AC or DC power source available?
 - Is a vertical surface available to mount the AirLink 7543?
 - Is there enough room to open the housing door and make wiring connections?
 - Are the display screen and status lights visible?
2. Close and latch the housing door.
3. Prepare the selected mounting site as required to mount the AirLink 7543. It should be mounted at eye level (4 1/2 to 5 feet from the floor). Refer to Figure 4 for the outline and mounting dimensions.
4. Position the monitor on the vertical mounting surface.
5. Insert 1/4" bolts or screws through the slots in the mounting feet at each corner of the housing to secure the housing to the mounting surface.

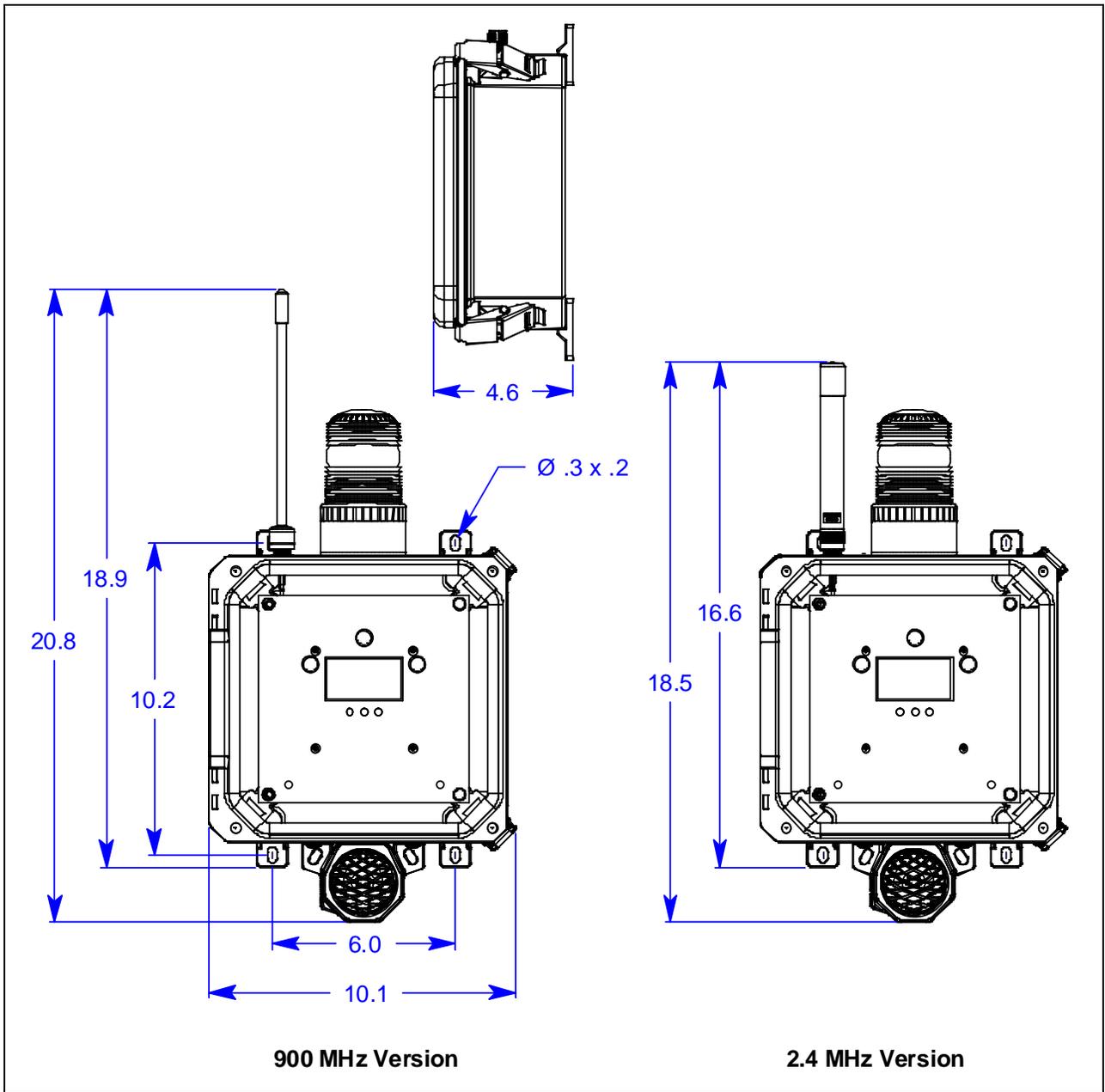


Figure 4: Outline and Mounting Dimensions

Wiring the AirLink 7543 Gas Monitor

This section describes procedures for DC power source wiring, AC power source wiring, Modbus out wiring, fault indicator wiring, and relay wiring.

The following wiring connections must be made before starting up the AirLink 7543.

RKI recommends using a minimum of 22 AWG wire. Different loads require different gauge wire. Use an appropriate wire size, depending on the voltage and current requirements.

CAUTION: *The internal components can be static sensitive. Use caution when opening the enclosure and handling internal components.*

WARNING: *Make all connections to the AirLink 7543 before you plug in or turn on the AC or DC power source. Before you make any wiring adjustments, always verify that all power sources are not live.*

Connecting a DC Power Source

NOTE: The AirLink 7543 is configured for AC or DC operation, depending on how it is ordered. If you are using AC power as the primary power source, go to the next section, “Connecting an AC Power Source”.

Provide a clean and stable 12-35 VDC. Failure to do so may cause the unit (and any wired sensors that are connected to the unit) to not operate properly.

Voltage spikes higher than 35 VDC may damage the unit.

1. Open the enclosure box to expose the Front Panel.
2. Unscrew the two thumb screws on the Front Panel.
3. Open the Front Panel so that the Terminal Board is exposed.
4. Locate the Power Terminal (on the left side of the Terminal Board) and connect the DC-live wire (red) to the terminal marked “+V”.
5. Connect the DC-ground wire (black) to the terminal marked “GND”.

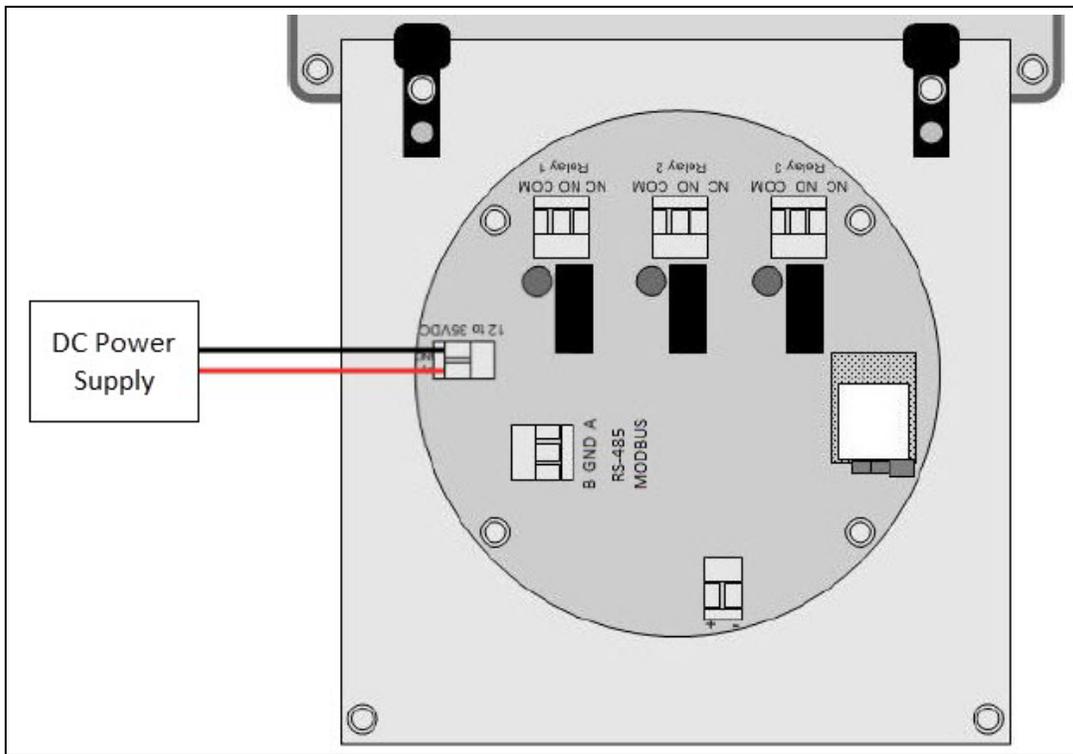


Figure 5: DC Wiring

6. Close the Front Panel.
7. Screw in the thumb-screws.
8. Close the enclosure box.
9. Clamp down the enclosure latches.

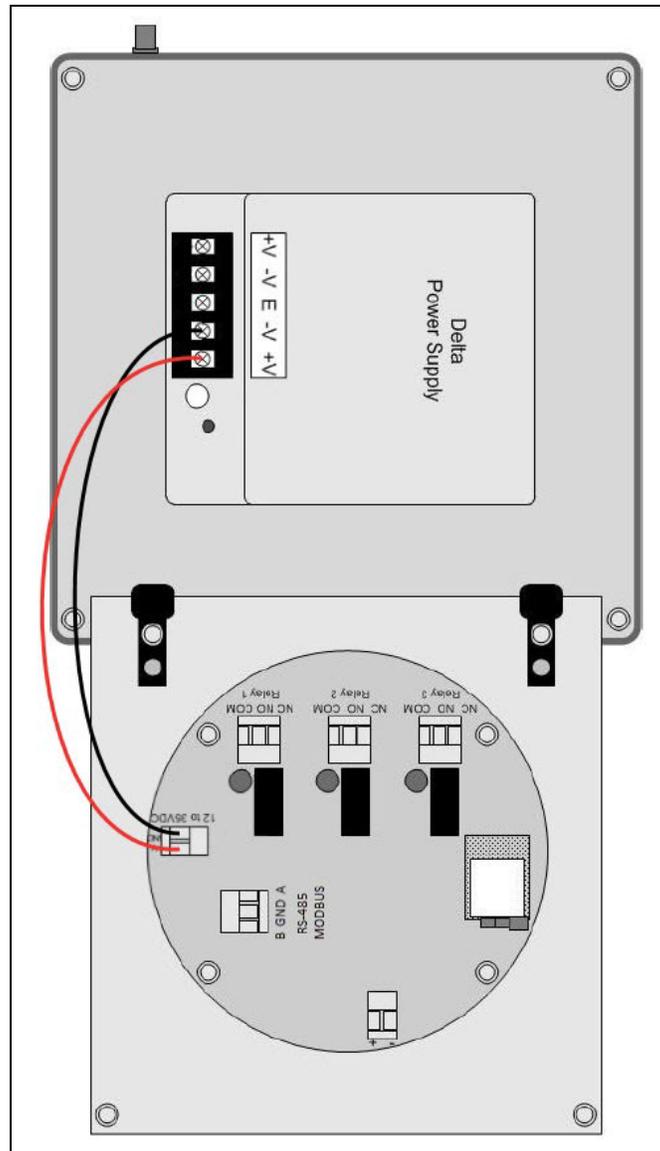
Connecting an AC Power Source

NOTE: The AirLink 7543 is configured for AC or DC operation, depending on how it is ordered. If you are using DC power as the primary power source, go to the previous section, “Connecting a DC Power Source”.

WARNING: *Verify that the power source is unplugged or turned off before you continue with this procedure.*

1. Open the enclosure box to expose the Front Panel.
2. Unscrew the two thumb-screws on the Front Panel.
3. Open the Front Panel so that the AC (Delta) Power Supply is exposed.

4. The power supply is factory wired to the Terminal Board.



5. For versions that came with a pre-wired AC line cord: there are three wires (black, white and green) pre-wired from the Delta power supply terminals “L” (AC Load IN), “N” (AC Neutral IN), and “EG” (Chassis GND or Earth GND). This set of wires will be used to plug into an AC power outlet ONCE ALL WIRING CONFIGURATIONS ARE COMPLETE.

6. For versions that did not come with a pre-wired AC line cord:
 - Connect a line wire from the AC power source to the power supply's "L" terminal.
 - Connect a neutral wire from the AC power source to the power supply's "N" terminal.
 - Connect a ground wire from the AC power source to the power supply's "EG" terminal.

NOTE: If the AirLink 7543 was not ordered with any housing holes, at least one hole will have to be drilled to bring in AC power.

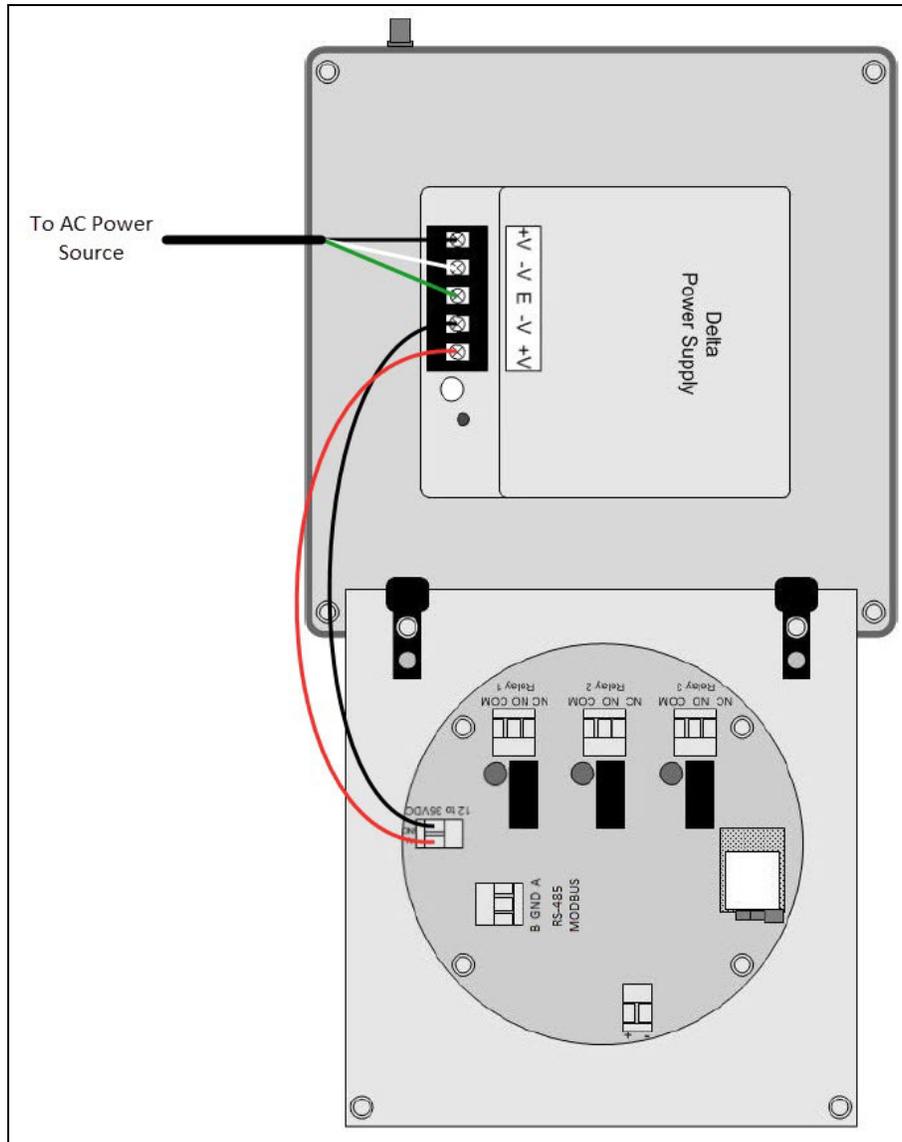


Figure 6: AC Wiring

7. Close the Front Panel.
8. Screw in the thumb-screws.
9. Close the enclosure box.
10. Clamp down the enclosure latches.

RS-485 Modbus Wiring (Modbus Out)

NOTE: The Modbus output is not available if Wireless HART is being used.

1. Open the enclosure box to expose the Front Panel.
2. Unscrew the two thumb-screws on the Front Panel.
3. Open the Front Panel so that the Terminal Board is exposed.
4. Locate the Modbus Out Terminal Block.
5. Connect the yellow wire from a DB-9 connector (or the connector-type that best suits your application) to the terminal labeled “A” on the Modbus Out Terminal Block.
6. Connect the white wire from a DB-9 connector to the terminal labeled “GND” on the Modbus Out Terminal Block.
7. Connect the brown wire from a DB-9 connector to the terminal labeled “B” on the Modbus Out Terminal Block.
8. Plug the DB-9 connector into a PLC.

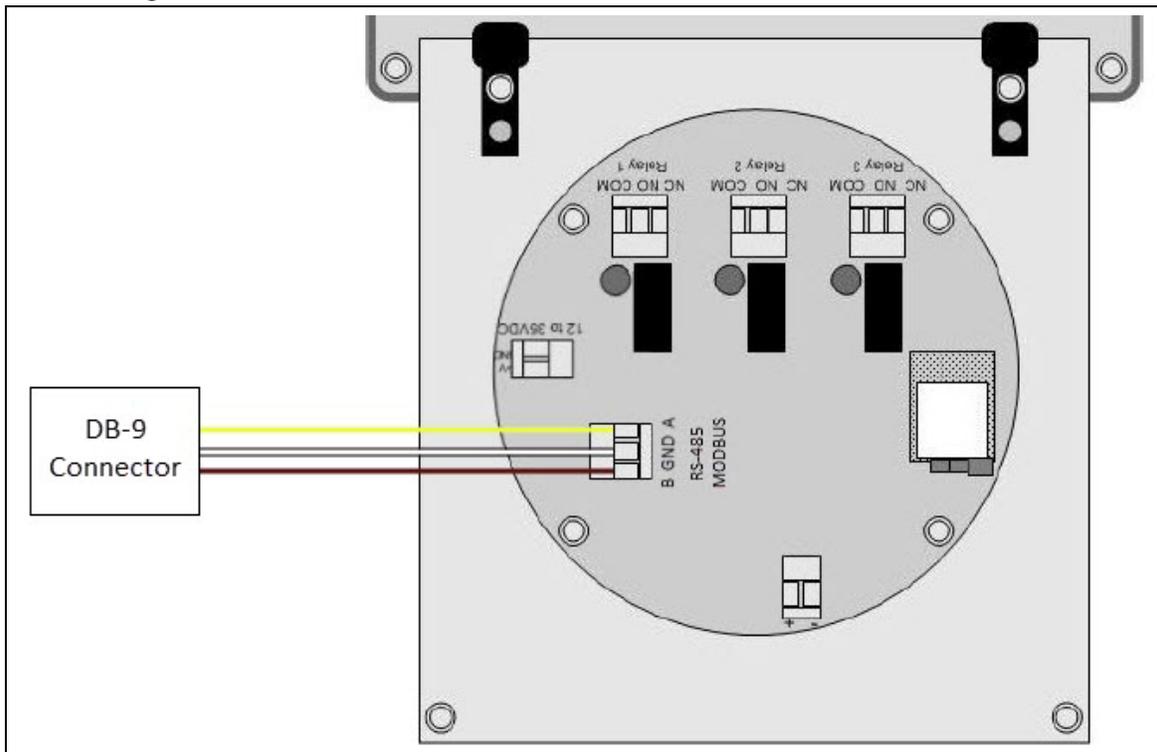


Figure 7: Modbus Out Wiring

9. Close the Front Panel.
10. Screw in the thumb-screws.
11. Close the enclosure box.
12. Clamp down the enclosure latches.

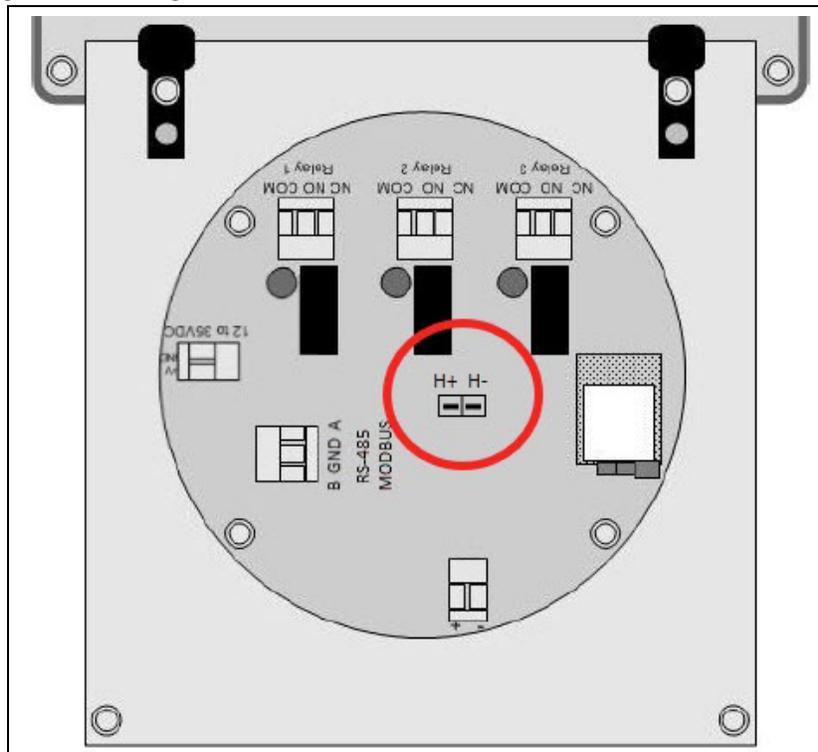
WirelessHART Setup

If the AirLink 7543 was ordered with WirelessHART, a module will be installed on the Terminal Board and the Modbus output will not be user-accessible.

1. Drill a hole in the housing and install the 2.4 GHz WirelessHART antenna. If the antenna receiving the detector signal is also a 2.4 GHz antenna, then remote either the receiving antenna or the WirelessHART antenna away from the AirLink 7543. If the receiving antenna is a 900 MHz antenna, then the WirelessHART antenna can be installed on the AirLink 7543's enclosure.

WARNING: *Seal the hole for the antenna or for the antenna cable to ensure water does not enter the enclosure.*

2. Connect a HART communicator to the “H+” and “H-” terminals on the Terminal Board to make configuration settings.



Fault Indicator Connection

The Fault terminal provides an output to power some form of Fault indicator. The Fault terminal is wet contact, uses the same supply voltage that powers the board, provides 500 mA maximum, and is a DC only output.

The fault terminal's failsafe operation can be configured as described in step 5 on page 29.

1. Open the enclosure box to expose the Front Panel.
2. Unscrew the two thumb-screws on the Front Panel.
3. Open the Front Panel so that the Terminal Board is exposed.
4. Locate the Fault Terminal Block on the terminal board.
5. Connect a positive (red) wire to the terminal labeled "+".
6. Connect a negative (black) wire to the terminal labeled "-".

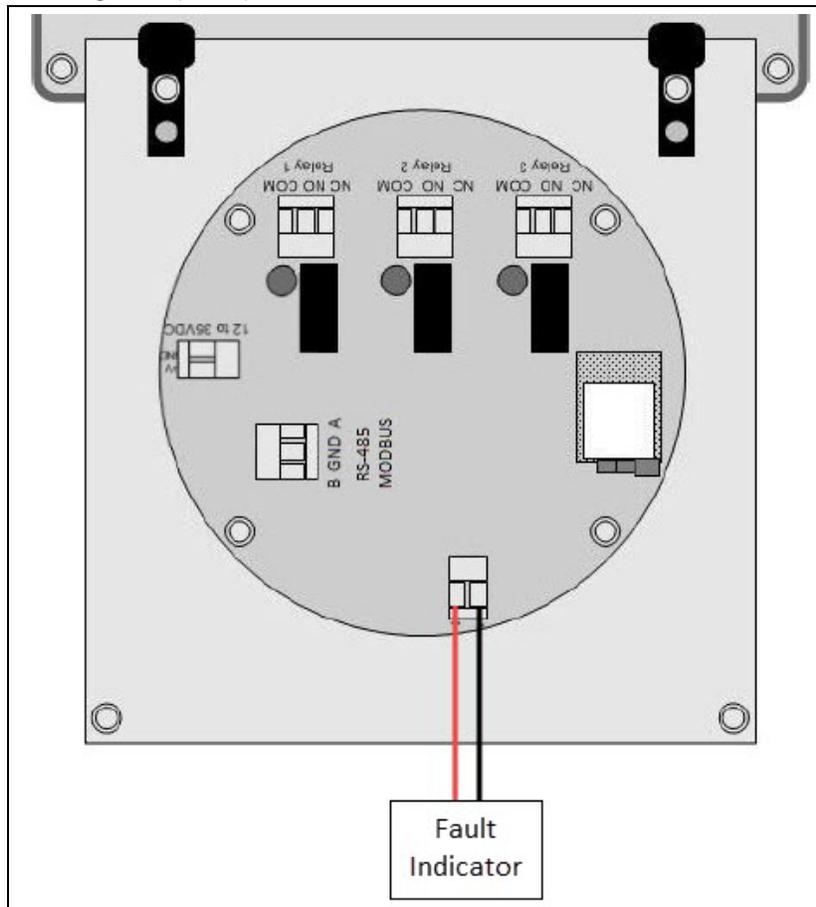


Figure 8: Fault Indicator Wiring

Relay Wiring

The AirLink 7543 has four relays. Two relays are intended for gas alarms, one relay can be used for gas alarms or a fault condition, and one relay is a dedicated fault relay. Each of the four relays may be setup as Normally Open (NO) or Normally Closed (NC). See page 35 for more explanation about relay actuation.

NOTE: If installed, the strobe is factory wired to the Relay 1 terminals and the horn is factory wired to the Relay 2 terminals.

1. Open the enclosure box to expose the Front Panel.
2. Unscrew the two thumb-screws on the Front Panel.
3. Open the Front Panel so that the Terminal Board is exposed.
4. Locate the Relay Terminal Blocks on the Terminal Board.
5. Connect the alarm device's "+ (H)" terminal to the **NO** or **NC** terminal on the relay terminal block.

NOTE: It is recommended that the relay connections are wired as normally-open (NO). However, normally-closed (NC) wiring configurations provide an inherent fail-safe and may be preferred.

6. Connect the alarm device's "- (N)" terminal to an external power source's "- (N)" terminal.
7. Connect the external power source's "+ (H)" terminal to the **COM** terminal on the relay terminal block.

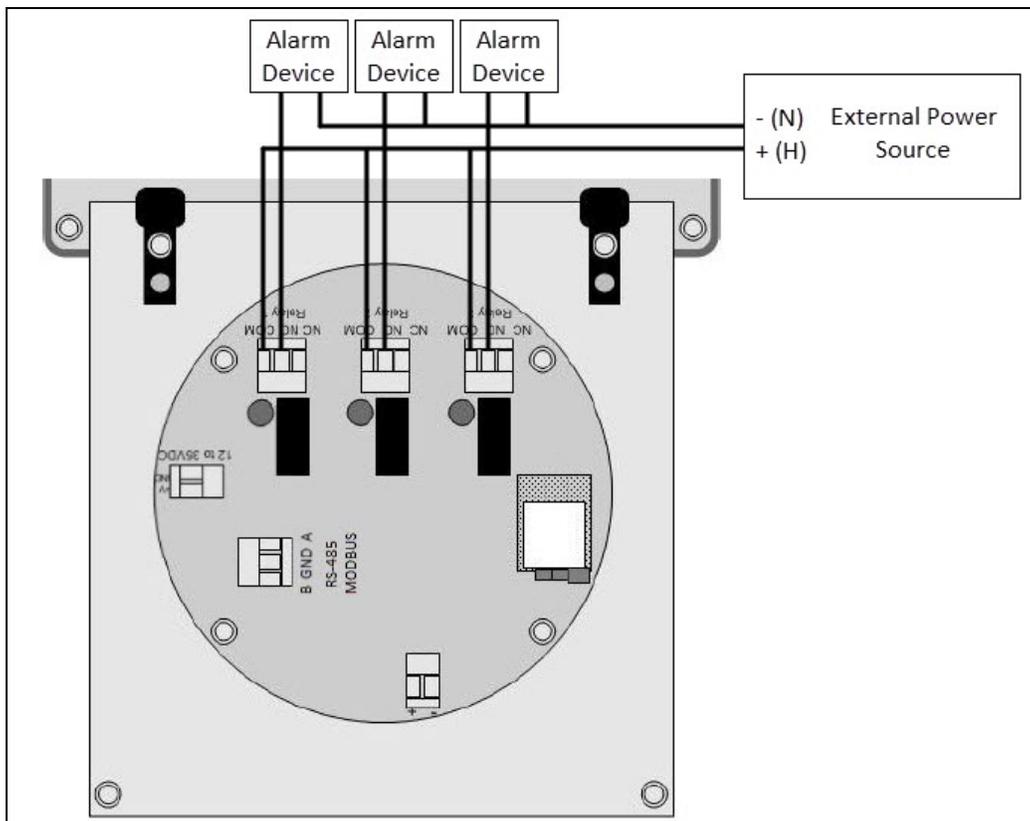


Figure 9: Relay Wiring

Chapter 4: Startup and Operation

Power On/Off

When power is first applied to the AirLink 7543, the unit automatically powers on and begins the startup sequence.

The AirLink 7543 will automatically power off when voltage is no longer applied to the unit.

Normal Operation

The AirLink 7543 can monitor up to 6 WireFree sensor assemblies.

When in Normal Operating Mode, configured channels are scanned through, 1 channel at a time, every 3 seconds and the following items are displayed:

- channel number
- radio address
- sensor assembly's battery level
- gas reading
- signal strength
- primary/secondary monitor status and network ID
- time since last transmission
- fault (if any)

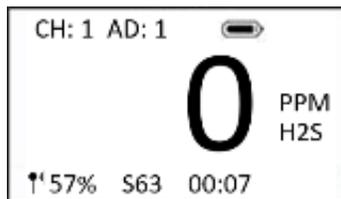


Figure 10: Normal Operating Mode

LED Functionality

LED	Color / Status	Description
ALARM 1	off	No alarm condition has occurred on relay 1 since the last reset or power up
	solid red	An alarm condition is currently happening on relay 1
	blinking red	An alarm condition has occurred on relay 1, but condition has now gone
ALARM 2	off	No alarm condition has occurred on relay 2 since the last reset or power up
	solid red	An alarm condition is currently happening on relay 2
	blinking red	An alarm condition has occurred on relay 2, but condition has now gone
ALARM 3	off	No alarm condition has occurred on relay 3 since the last reset or power up
	solid red	An alarm condition is currently happening on relay 3
	blinking red	An alarm condition has occurred on relay 3, but condition has now gone

1. Press and release *MENU* to clear an alarm indication once the alarm condition has cleared.

Chapter 5: Setup Mode

Overview

This mode is used for: Channel Settings (On/Off, radio address), Relay Settings (On/Off, Decreasing/Increasing, Value, Latching/Auto Resetting), and System Information.

NOTE: Each channel must be set up individually.

Entering Setup Mode

1. Open the enclosure box.
2. From Normal Operating Mode, press and hold *MENU* for 5 seconds to enter Setup Mode.

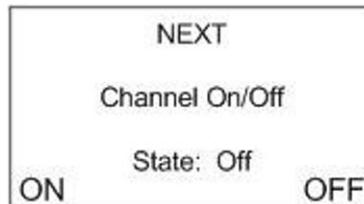
NOTE: To save any changes and exit Setup Mode at any time, press *ADD* or *SUB* until you get to the Information Screen and then press *MENU*. The AirLink 7543 automatically saves any changes and returns to Normal Operating Mode 15 minutes after the last button press.

Channel Settings

1. Channel Selection: Once in Setup Mode, press *ADD* (increase) or *SUB* (decrease) to select the channel you want to set up (1-6).



2. Press *MENU* (Next).
3. Channel On/Off: Press *ADD* or *SUB* to change the state of the channel to On or Off.



4. Press *MENU* (Next).

5. Radio Address: Press *ADD* (increase) or *SUB* (decrease) to set to radio address (1-255).

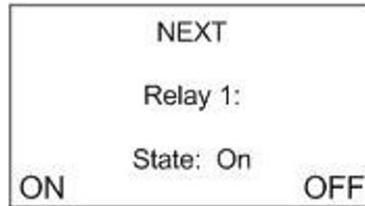


6. Press *MENU* (Next).

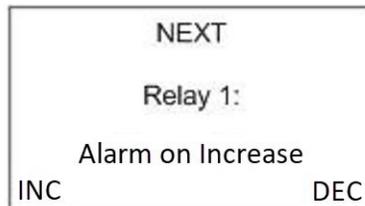
Relay Settings

See page 35 for more explanation about relay actuation.

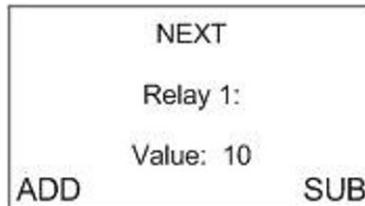
1. Relay On/Off: Press *ADD* or *SUB* to manipulate the relay's On/Off status. The On/Off status affects whether a relay is active on the selected channel or not.



2. Press *MENU* (Next).
3. Relay Increasing/Decreasing: Press *ADD* or *SUB* to manipulate the relay's Increasing/Decreasing status.



4. Press *MENU* (next).
5. Relay Threshold: Press *ADD* (increase) or *SUB* (decrease) to manipulate the threshold value (1-65,000).

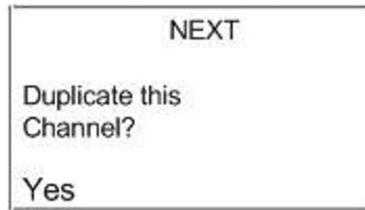


6. Press *MENU* (Next).

7. Relay Latch/Auto Reset: Press *ADD* or *SUB* to manipulate the relay's Latching/Auto Reset status.



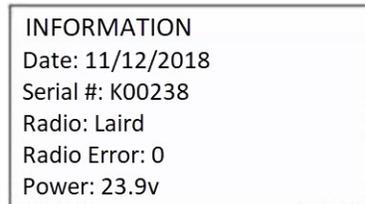
8. Press *MENU* (Next).
9. Repeat step 1 through step 8 for the remaining relays.
10. Once all three relays have been setup, the display screen will show the following:



11. Based on the specific application, choose one of the following steps to complete:
- Press *MENU* (Next) to setup the next channel (or continue to system information)
 - Press *ADD* (Yes) to duplicate the settings to all consecutive channels—and *ADD* (Yes) again to confirm the operation

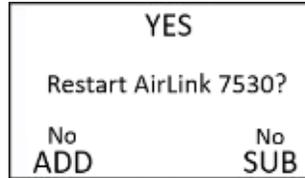
View System Information

After the last channel is set, press *MENU* to view the system's information.

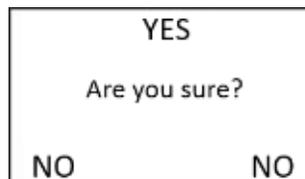


Restarting the AirLink 7543

A restart is necessary to access Advanced Configuration Mode. This menu item allows you to restart the system without having to disconnect and reconnect the power source, which may be far away from the device. See page 27 for instructions to enter the Advanced Configuration Menu.



1. Press *MENU*.
2. The device will ask you to confirm the restart.



3. Press *MENU* to restart the device.

Exiting Setup Mode

1. From the System Information screen, press *MENU* to exit Setup Mode.
2. Close the enclosure box.
3. Clamp down the enclosure latches.

NOTE: The AirLink 7543 automatically saves any changes and returns to Normal Operating Mode 15 minutes after the last button press.

Chapter 6: Advanced Configuration Menu

Overview

This mode is used to: adjust LCD contrast, restore factory default settings, set up the fault relay, set up the relay failsafe, set up global Modbus parameters, and set up WireFree parameters.

Entering the Advanced Configuration Menu

1. Open the enclosure box to expose the Front Panel.
2. Cycle the unit's power either by disconnecting and reconnecting power or by doing the following.
 - a. Press and hold *MENU* for 5 seconds from Normal Operating Mode.
 - b. Press and release *MENU* until the “Restart AirLink 7543” screen appears.
 - c. Press *MENU*.
 - d. Press *MENU* again to confirm the restart.
3. When the RKI Logo appears on the Display Screen, press *MENU*.

NOTE: The AirLink 7543 automatically saves any changes and returns to Normal Operating Mode 15 minutes after the last button press.

Adjusting Contrast

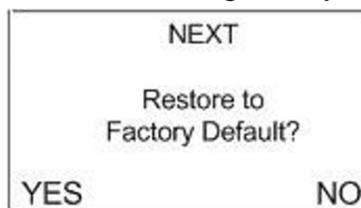
1. Press *ADD* (increase) or *SUB* (decrease) to manipulate the screen's LCD contrast.



2. Press *MENU*.

Restore Factory Default Settings

1. Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to set the unit back to the factory's default settings. To leave the settings as they are, press *MENU* (Next).

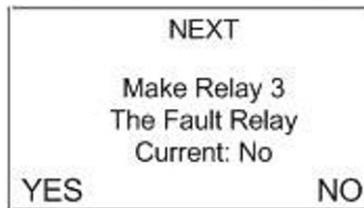


Factory settings are:

- Channels 1-6 “On”
- Channel addresses set to 1-6
- Relays set at “10, 15, 20 and 25”
- All relays set to “Auto Reset” / “Increasing”
- Modbus Output Baud set at 9600
- Radio Timeout set to 10 minutes
- Network ID set to 5
- Secondary Monitor

Relay Setup

1. Set Relay 3 as Fault Relay: Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to setup Relay 3 as the Fault Relay. To leave the setting as it is, press *MENU* (Next).



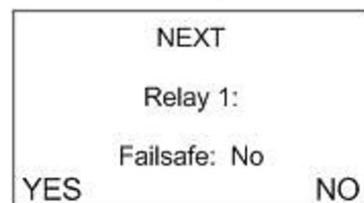
NOTE: With this feature enabled, if any Fault occurs (on any channel) the Fault Relay is engaged. In addition, Relay 3 is removed from all setup options.

2. Relay 3 as Fault Relay Latching/Auto Reset: Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to setup the Relay 3 Fault Relay as latching or auto resetting. To leave the setting as it is, press *MENU* (Next).

NOTE: This screen only appears if Relay 3 was set up as the fault relay.



3. Failsafe: Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to setup Relay 1 as failsafe (or not failsafe). To leave the setting as it is, press *MENU* (Next).



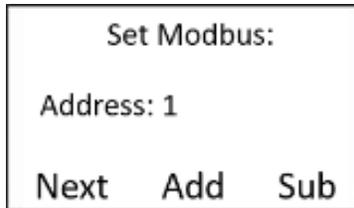
4. Repeat step 3 for Relays 2 and 3.

5. Fault Terminal Failsafe: Press *ADD* or *SUB* (Yes/No—as indicated on the display screen) to setup the Fault terminal as failsafe (or not failsafe). To leave the setting as it is, press *MENU* (Next).



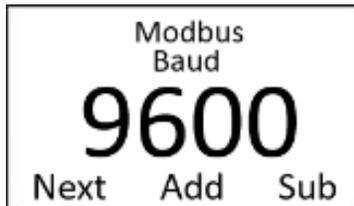
Modbus Setup

1. Global Modbus Address: Press *ADD* (increase) or *SUB* (decrease) to manipulate the global Modbus Address setting (between 1 and 247).
2. If using WirelessHART, the Modbus address must be set to 1.



3. Press *MENU* (Next).
4. Global Baud: Press *ADD* (increase) or *SUB* (decrease) to manipulate the global Baud setting to: 4800, 9600, or 19200.

NOTE: Baud default is 9600. If using WirelessHART, the Modbus baud must be set to 19200.



5. Press *MENU* (Next).

WireFree Setup

1. Radio Timeout: Press *ADD* (increase) or *SUB* (decrease) to manipulate the Radio Timeout setting (between 6 and 255 minutes).



2. Press *MENU* (Next).
3. Network Channel: Press *ADD* (increase) or *SUB* (decrease) to manipulate the Network Channel setting (between 1 and 52 for 900 MHz systems or between 1 and 78 for 2.4 GHz systems).

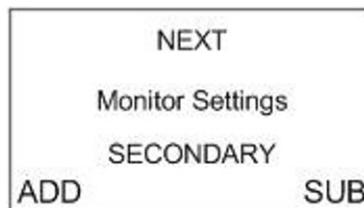
NOTE: All monitors and sensor assemblies must have the same Network Channel in order to communicate.



4. Press *MENU* (Next).
5. Primary/Secondary: Press *ADD* or *SUB* to switch the monitor to “Primary” or “Secondary”.

NOTE: There can only be one Primary monitor on a network. All other monitors must be set up as Secondary monitors.

If an AirLink 7543 is set as a Secondary monitor when there is no Primary monitor, the AirLink 7543 will go into a Fault 15 status.



6. Press *MENU* (Next) to exit the Advanced Configuration Menu and return to Normal Operating Mode.

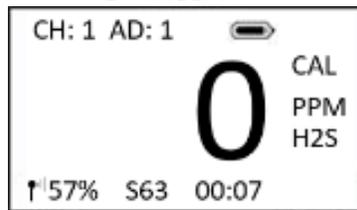
NOTE: The AirLink 7543 automatically saves any changes and returns to Normal Operating Mode 15 minutes after the last button press.

Chapter 7: Maintenance

Calibration Mode

Entering Calibration Mode disables the relays and allows the sensors to be calibrated without triggering alarms. Once in Calibration Mode, the unit will remain in this state for two hours—unless *MENU* is pressed.

1. Open the enclosure box to expose the Front Panel.
2. To enter Calibration Mode, from Normal Operating Mode, press and hold *MENU* and *ADD* for 5 seconds.
3. Once in Calibration Mode, the display appears as shown below.



4. To return to Normal Operating Mode, press and release *MENU*.

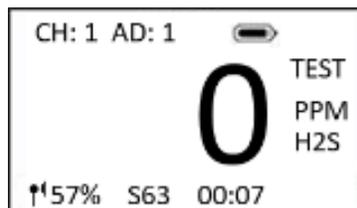
NOTE: If *MENU* is not pressed, the unit will remain in Calibration Mode for two hours.

5. Close the enclosure box.
6. Clamp down the enclosure latches.

Relay Test Mode

Relay Test Mode activates each relay and can be used to determine whether or not the relays and attached alarms are functioning properly.

1. Open the enclosure box to expose the Front Panel.
2. To enter Relay Test Mode, from Normal Operating Mode, press and hold *MENU* and *SUB*.
3. Starting with Relay 1, the relays will activate in 5-second intervals. Continue to hold *MENU* and *SUB*.



4. Release *MENU* and *SUB*.
5. To return to Normal Operating Mode, press and release *MENU*.
6. Close the enclosure box.
7. Clamp down the enclosure latches.

Troubleshooting

Table 2 describes symptoms, probable causes, and recommended actions for the most common problems you may encounter with the AirLink 7543.

NOTE: This troubleshooting guide describes [AirLink 7543](#) problems only. See the detector head operator's manuals for preventive maintenance procedures that apply to the detector heads installed on your AirLink 7543.

Table 2: Troubleshooting the AirLink 7543

Condition	Probable Causes	Recommended Action
F1 (Only for AirLink T3A/AirLink VOC Pro/Air Alert with Radio)	The top card has lost communication with the digital sensor board (the board potted into the sensor housing).	1. Check the connections and/or try new digital sensor board.
F3 (battery powered detector only)	The Low Power IR sensor is beyond repair.	1. Replace the IR sensor.
F4	<ul style="list-style-type: none"> The top card is losing communication to the analog sensor board On AirLink T3A/AirLink VOC Pro/Air Alert (with radio) units, F4 means that the Analog to Digital Conversion (ADC) on the analog sensor board is not communicating to the digital sensor board. On the AirLink 6900, F4 means the top card is not communicating with the analog sensor board. For IR sensors, the sensor element itself could be the issue. Also, there might not be an issue because sometimes sensor assemblies will show F4 for a few seconds after boot up. This is normal and is due to the boot up of the sensor element itself. 	<ol style="list-style-type: none"> Check the orientation of the analog sensor board and/or try a new analog sensor board. Check the connections from the top card all the way to the analog sensor board. If that does not fix the fault, try replacing the analog sensor board and/or the sensor housing.
F8	There are 2 sensor assemblies with the same address trying to communicate with the monitor.	1. Make sure all sensor assemblies have unique addresses.

Table 2: Troubleshooting the AirLink 7543 (Continued)

Condition	Probable Causes	Recommended Action
F9	The monitor has not received a communication from the faulting sensor assembly address for the timeout period set on page 30.	1. Check the sensor assembly for a dead battery, broken antenna, bad antenna cable, missing antenna, obstacle, weather, etc.
F11 (battery powered detector only)	The IR sensor is changing temperature too quickly.	1. The sensor will clear once the temperature stops changing too quickly.

Chapter 8: Parts List

Table 3 lists the part numbers and descriptions for replacement parts and accessories offered for the AirLink 7543 Gas Monitor.

Table 3: Parts List, AirLink 7543 Gas Monitor

Part No.	Description
18-0107RK	Conduit hub (3/4 in.)
47-5111-XX	Cable with connectors for remote-mounted antenna (specify length in 1-foot increment when ordering; maximum length is 100 feet)
51-0040-RED	Strobe/horn, 20 - 28 VDC, Cl. I Div. 1 Zone 1
71-0565	AirLink 7543 Gas Monitor Operator's Manual (this document)

Appendix A: Relay Operation

Relays are offered in certain RKI devices for the purpose of activating alarms, horns, and other equipment upon the detection of gas.

There are two key terms to remember when using relays.

- Deactivated: refers to a relay in its normal state
- Activated: refers to a relay in an alarm state

“Dry” Contact and “Wet” Contact Relays

In regard to power, there are two types of relays.

1. Dry Contact Relays: This type of relay does not provide power to the equipment attached to it (i.e. if there is a light hooked up to this type of relay, it must be powered by another source).
2. Wet Contact Relays: This type of relay does provide power to the equipment attached to it (i.e. if a light was hooked up to this type of relay, it would be powered by the relay). When using a Wet Contact Relay, power should run through the “COMM” terminal to the end equipment.

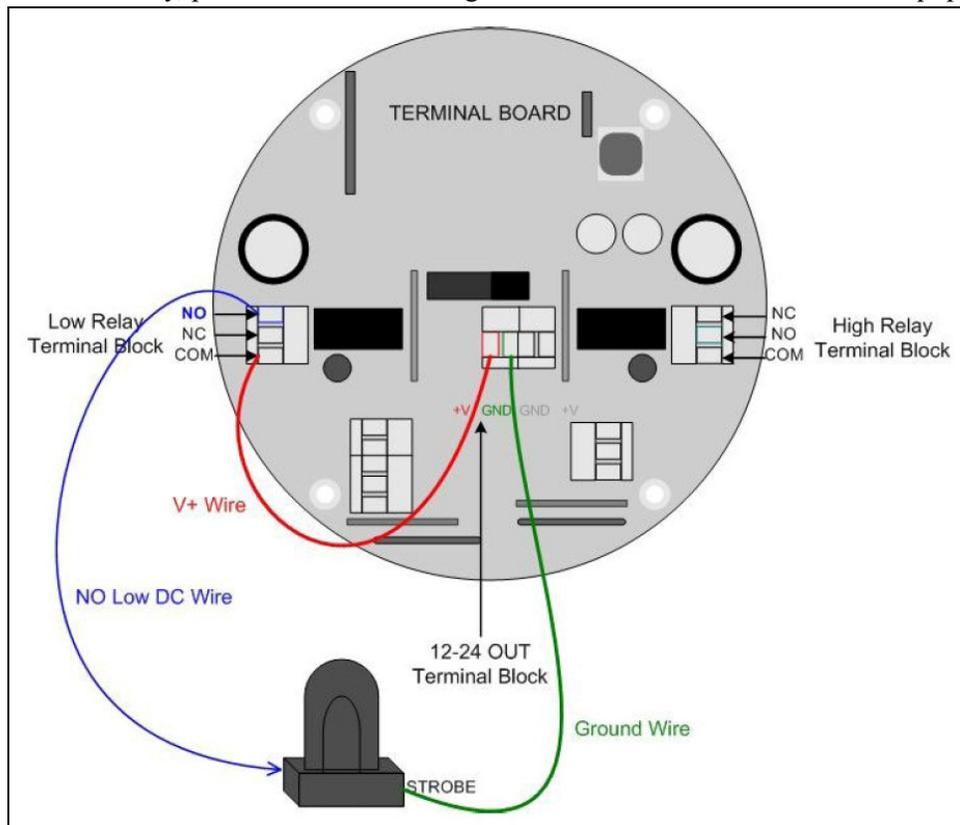


Figure 11: “Dry” Contact Relay Configured as a “Wet” Contact

Failsafe Setting's Effect on Normally-Open/Normally-Closed Contacts

If Failsafe is set to No, the relays are de-energized in normal operation and energize when the appropriate alarm circuit is activated. The NO (normally open) relay contacts are open during non-alarm operation and close when the appropriate alarm condition occurs. The NC (normally closed) relay contacts are closed during non-alarm operation and open when the appropriate alarm condition occurs.

If Failsafe is set to Yes, the relays are energized in normal operation and de-energize when the appropriate alarm circuit is activated. The NO (normally open) relay contacts are closed during non-alarm operation and open when the appropriate alarm condition occurs. The NC (normally closed) relay contacts are open during non-alarm operation and close when the appropriate alarm condition occurs.

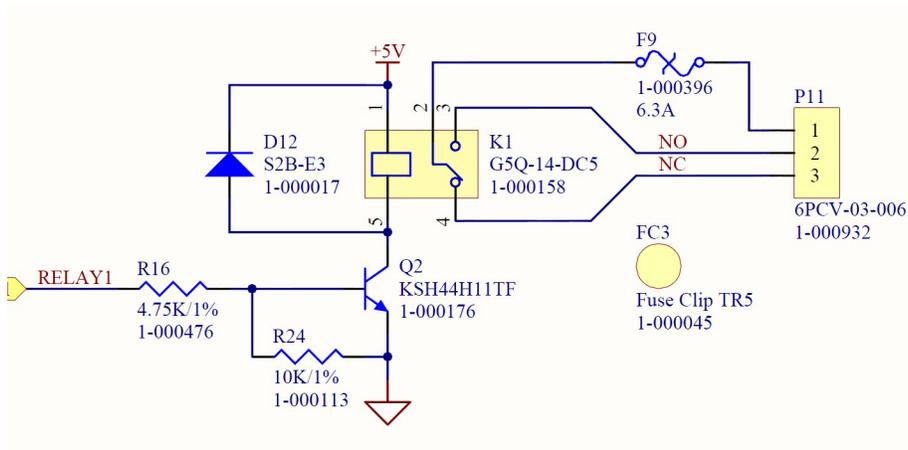


Figure 12: Relay Circuit Schematic

Appendix B: RS-485 Modbus Output

Modbus Terms

Modbus: RTU

Setting: Baud Rate = 9600

Data Bits: 8

Parity: None

Stop Bits: 1

Time Out: 1000 ms

Device Address: 1-247

Data Type: Holding Registers

Start Address: The first register the user would like to view (must be between 1-255)

Length: Depends on the number of addresses the user would like to view

Scan Rate: 1000 ms

Data Format: Hex, Decimal, Float

Register Map

AirLink 7543 Modbus Register Map

Register Address (Hexadecimal)	Register Address (Decimal)	Data Description	R/W	Length (In Bits)	Units	Valid Response
Radio Data						
1	1	Channel 1 Radio Address	R/W	16	INTEGER	Radio Address (1-255)
2	2	Channel 2 Radio Address	R/W	16	INTEGER	Radio Address (1-255)
3	3	Channel 3 Radio Address	R/W	16	INTEGER	Radio Address (1-255)
4	4	Channel 4 Radio Address	R/W	16	INTEGER	Radio Address (1-255)
5	5	Channel 5 Radio Address	R/W	16	INTEGER	Radio Address (1-255)
6	6	Channel 6 Radio Address	R/W	16	INTEGER	Radio Address (1-255)
7	7	Channel 1 Reading	R	32	FLOAT	Any valid sensor reading
9	9	Channel 2 Reading	R	32	FLOAT	Any valid sensor reading
B	11	Channel 3 Reading	R	32	FLOAT	Any valid sensor reading
D	13	Channel 4 Reading	R	32	FLOAT	Any valid sensor reading
F	15	Channel 5 Reading	R	32	FLOAT	Any valid sensor reading
11	17	Channel 6 Reading	R	32	FLOAT	Any valid sensor reading
13	19	Channel 1 Mode	R	16	ENUMERATION	0-7 See Mode Enumeration Below
14	20	Channel 2 Mode	R	16	ENUMERATION	0-7 See Mode Enumeration Below
15	21	Channel 3 Mode	R	16	ENUMERATION	0-7 See Mode Enumeration Below
16	22	Channel 4 Mode	R	16	ENUMERATION	0-7 See Mode Enumeration Below
17	23	Channel 5 Mode	R	16	ENUMERATION	0-7 See Mode Enumeration Below
18	24	Channel 6 Mode	R	16	ENUMERATION	0-7 See Mode Enumeration Below
19	25	Channel 1 Battery	R	32	FLOAT	Sensor Input Voltage(>= 0.0)
1B	27	Channel 2 Battery	R	32	FLOAT	Sensor Input Voltage(>= 0.0)
1D	29	Channel 3 Battery	R	32	FLOAT	Sensor Input Voltage(>= 0.0)
1F	31	Channel 4 Battery	R	32	FLOAT	Sensor Input Voltage(>= 0.0)
21	33	Channel 5 Battery	R	32	FLOAT	Sensor Input Voltage(>= 0.0)
23	35	Channel 6 Battery	R	32	FLOAT	Sensor Input Voltage(>= 0.0)
25	37	Channel 1 Sec Since Last Message	R	16	INTEGER	-1-32768 Secs, -1 = never. Staying 0 = timeout
26	38	Channel 2 Sec Since Last Message	R	16	INTEGER	-1-32768 Secs, -1 = never. Staying 0 = timeout
27	39	Channel 3 Sec Since Last Message	R	16	INTEGER	-1-32768 Secs, -1 = never. Staying 0 = timeout
28	40	Channel 4 Sec Since Last Message	R	16	INTEGER	-1-32768 Secs, -1 = never. Staying 0 = timeout
29	41	Channel 5 Sec Since Last Message	R	16	INTEGER	-1-32768 Secs, -1 = never. Staying 0 = timeout
2A	42	Channel 6 Sec Since Last Message	R	16	INTEGER	-1-32768 Secs, -1 = never. Staying 0 = timeout
2B	43	Channel 1 Sensor Type	R	16	ENUMERATION	0-31 See Sensor Type Enumeration Below

2C	44	Channel 2 Sensor Type	R	16	ENUMERATION	0-31 See Sensor Type Enumeration Below
2D	45	Channel 3 Sensor Type	R	16	ENUMERATION	0-31 See Sensor Type Enumeration Below
2E	46	Channel 4 Sensor Type	R	16	ENUMERATION	0-31 See Sensor Type Enumeration Below
2F	47	Channel 5 Sensor Type	R	16	ENUMERATION	0-31 See Sensor Type Enumeration Below
30	48	Channel 6 Sensor Type	R	16	ENUMERATION	0-31 See Sensor Type Enumeration Below
31	49	Channel 1 Gas Type	R	16	ENUMERATION	0-127 See Gas Enumeration below
32	50	Channel 2 Gas Type	R	16	ENUMERATION	0-127 See Gas Enumeration below
33	51	Channel 3 Gas Type	R	16	ENUMERATION	0-127 See Gas Enumeration below
34	52	Channel 4 Gas Type	R	16	ENUMERATION	0-127 See Gas Enumeration below
35	53	Channel 5 Gas Type	R	16	ENUMERATION	0-127 See Gas Enumeration below
36	54	Channel 6 Gas Type	R	16	ENUMERATION	0-127 See Gas Enumeration below
37	55	Channel 1 Fault	R	16	ENUMERATION	0-15 See Fault Enumeration below
38	56	Channel 2 Fault	R	16	ENUMERATION	0-15 See Fault Enumeration below
39	57	Channel 3 Fault	R	16	ENUMERATION	0-15 See Fault Enumeration below
3A	58	Channel 4 Fault	R	16	ENUMERATION	0-15 See Fault Enumeration below
3B	59	Channel 5 Fault	R	16	ENUMERATION	0-15 See Fault Enumeration below
3C	60	Channel 6 Fault	R	16	ENUMERATION	0-15 See Fault Enumeration below
3D	61	Channel 1 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
3E	62	Channel 2 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
3F	63	Channel 3 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
40	64	Channel 4 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
41	65	Channel 5 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
42	66	Channel 6 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
43	67	Channel 1 Relay 1 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
44	68	Channel 2 Relay 1 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
45	69	Channel 3 Relay 1 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
46	70	Channel 4 Relay 1 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
47	71	Channel 5 Relay 1 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
48	72	Channel 6 Relay 1 On/Off	R/W	16	ENUMERATION	0 – 1, 0 means off, 1 means on
49	73	Channel 1 Relay 1 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
4A	74	Channel 2 Relay 1 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
4B	75	Channel 3 Relay 1 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
4C	76	Channel 4 Relay 1 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
4D	77	Channel 5 Relay 1 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
4E	78	Channel 6 Relay 1 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
4F	79	Channel 1 Relay 1 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
51	81	Channel 2 Relay 1 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
53	83	Channel 3 Relay 1 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
55	85	Channel 4 Relay 1 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
57	87	Channel 5 Relay 1 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0

59	89	Channel 6 Relay 1 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
5B	91	Channel 1 Relay 1 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
5C	92	Channel 2 Relay 1 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
5D	93	Channel 3 Relay 1 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
5E	94	Channel 4 Relay 1 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
5F	95	Channel 5 Relay 1 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
60	96	Channel 6 Relay 1 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
61	97	Channel 1 Relay 2 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
62	98	Channel 2 Relay 2 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
63	99	Channel 3 Relay 2 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
64	100	Channel 4 Relay 2 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
65	101	Channel 5 Relay 2 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
66	102	Channel 6 Relay 2 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
67	103	Channel 1 Relay 2 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
68	104	Channel 2 Relay 2 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
69	105	Channel 3 Relay 2 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
6A	106	Channel 4 Relay 2 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
6B	107	Channel 5 Relay 2 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
6C	108	Channel 6 Relay 2 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
6D	109	Channel 1 Relay 2 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
6F	111	Channel 2 Relay 2 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
71	113	Channel 3 Relay 2 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
73	115	Channel 4 Relay 2 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
75	117	Channel 5 Relay 2 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
77	119	Channel 6 Relay 2 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
79	121	Channel 1 Relay 2 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
7A	122	Channel 2 Relay 2 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
7B	123	Channel 3 Relay 2 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
7C	124	Channel 4 Relay 2 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
7D	125	Channel 5 Relay 2 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
7E	126	Channel 6 Relay 2 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
7F	127	Channel 1 Relay 3 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
80	128	Channel 2 Relay 3 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
81	129	Channel 3 Relay 3 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
82	130	Channel 4 Relay 3 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
83	131	Channel 5 Relay 3 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
84	132	Channel 6 Relay 3 On/Off	R/W	16	ENUMERATION	0 - 1 ,0 means off, 1 means on
85	133	Channel 1 Relay 3 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
86	134	Channel 2 Relay 3 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
87	135	Channel 3 Relay 3 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high

88	136	Channel 4 Relay 3 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
89	137	Channel 5 Relay 3 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
8A	138	Channel 6 Relay 3 Rise/Fall	R/W	16	ENUMERATION	0 - 1 ,0 means low, 1 means high
8B	139	Channel 1 Relay 3 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
8D	141	Channel 2 Relay 3 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
8F	143	Channel 3 Relay 3 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
91	145	Channel 4 Relay 3 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
93	147	Channel 5 Relay 3 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
95	149	Channel 6 Relay 3 Set Point	R/W	32	FLOAT	Any number 65000 or less and higher than 0
97	151	Channel 1 Relay 3 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
98	152	Channel 2 Relay 3 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
99	153	Channel 3 Relay 3 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
9A	154	Channel 4 Relay 3 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
9B	155	Channel 5 Relay 3 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
9C	156	Channel 6 Relay 3 Latch/Unlatch	R/W	16	ENUMERATION	0 - 1 ,0 means unlatch, 1 means latch
Modbus and Build Data						
1771	6001	Modbus Address	R	16	INTEGER	1 – 247
1772	6002	Modbus Baud Rate	R	16	INTEGER	Any Valid Baud Rate. See Below.
1773	6003	Month	R	16	INTEGER	1 – 12
1774	6004	Day	R	16	INTEGER	1 – 31
1775	6005	Year	R	16	INTEGER	2009 –
1776	6006	Serial Number Character	R	16	ENUMERATION	0 – 52 See Serial Number below
1777	6007	Serial Number	R	32	LONG INT	1 – 99999
Settings in Startup Menu						
177B	6011	Restore to Factory Default	R	16	ENUMERATION	When read will be 0.
177C	6012	Relay 3 as Fault Relay	R	16	ENUMERATION	0 – 1, 0 means normal relay, 1 means Fault Relay
177D	6013	Relay 1 Fail Safe	R	16	ENUMERATION	0 – 1, 0 means not Fail Safe, 1 means Fail Safe
177E	6014	Relay 2 Fail Safe	R	16	ENUMERATION	0 – 1, 0 means not Fail Safe, 1 means Fail Safe
177F	6015	Relay 3 Fail Safe	R	16	ENUMERATION	0 – 1, 0 means not Fail Safe, 1 means Fail Safe
1780	6016	N/A	R	16		Read as 0.
1781	6017	Fault Terminal Fail Safe	R	16	ENUMERATION	0 – 1, 0 means not Fail Safe, 1 means Fail Safe
1782	6018	Radio Timeout	R	16	INTEGER	6-255. This is the timeout in minutes.
1783	6019	Network Channel	R	16	INTEGER	1–78
1784	6020	Primary Secondary	R	16	ENUMERATION	0 – 1, 0 means Primary, 1 means Secondary.
Relays in Alarm State						
1785	6021	Relay 1 is in Alarm	R	16	ENUMERATION	0 – 1, 0 means not in Alarm, 1 means in Alarm
1786	6022	Relay 2 is in Alarm	R	16	ENUMERATION	0 – 1, 0 means not in Alarm, 1 means in Alarm
1787	6023	Relay 3 is in Alarm	R	16	ENUMERATION	0 – 1, 0 means not in Alarm, 1 means in Alarm
17A5	6053	Monitor Supply Voltage	R	32	FLOAT	Supply voltage in volts. (Added in Firmware 6.0.8)
Diagnostics Data						

2704	9988	Reset	R/W	16	INTEGER	Read 0. If user sets to 1, resets the unit.
2705	9989	Serial Receive Good Count	R	16	UINT	0 – 65535
2706	9990	Serial Receive Error Count	R	16	UINT	0 – 65535
2707	9991	Serial Transmit Good Count	R	16	UINT	0 – 65535
2708	9992	Serial Transmit Error Count	R	16	UINT	0 – 65535
2709	9993	Radio Receive Good Count	R	16	UINT	0 – 65535
270A	9994	Radio Receive Error Count	R	16	UINT	0 – 65535
270B	9995	Radio Transmit Good Count	R	16	UINT	0 – 65535
270C	9996	Radio Transmit Error Count	R	16	UINT	0 – 65535
270D	9997	Uptime Days	R	16	UINT	0 – 65535
270E	9998	Uptime Hours	R	16	UINT	0 – 65535
270F	9999	Uptime Minutes	R	16	UINT	0 – 65535

MODE SENSOR	MODE
0	NORMAL
1	NULL
2	CALIBRATION
3	RELAY
4	Radio ADD
5	Diagnostic/ Batt
6	Advanced Menu
7	Admin Menu

Valid Baud Rates
4800
9600
19200

Serial Number Char	Char
1	A
2	B
3	C
4	D
5	E
6	F
7	G
8	H
9	I
10	J
11	K
12	L
13	M
14	N
15	O

SENSOR TYPE NUM	SENSOR
0	EC
1	IR
2	CB
3	MOS
4	PID
5	TANK
6	4-20
7	SWITCH
8	Unknown
30	WF190
31	None Selected

FAULT	FAULT
0	NONE
1	Sensor Timeout
2	Sensor reading below null (152 Model Only)
3	Replace sensor element (LPIR Only)
4	ADC not responding
5	Null Failed
6	Cal Failed

16	P
17	Q
18	R
19	S
20	T
21	U
22	V
23	W
24	X
25	Y
26	Z
27	AA
28	AB
29	AC
30	AD
31	AE
32	AF
33	AG
34	AH
35	AI
36	AJ
37	AK
38	AL
39	AM
40	AN
41	AO
42	AP
43	AQ
44	AR
45	AS
46	AT
47	AU
48	AV
49	AW
50	AX
51	AY
52	AZ

7	Future Error
8	Two Sensors Same Address
9	Sensor Radio Timeout
10	When Sensor is wired, it means no sensor is connected
11	Rapid Temperature Change (LPIR Only)
12	Sensor element Restarting (LPIR Only)
13	Unspecified Error on sensor unit. Shown only on Monitor
14	No Primary Monitor at Sensor Head
15	Monitor Fault

GAS TYPE NUM	GAS
0	H2S
1	SO2
2	O2
3	CO
4	CL2
5	CO2
6	LEL
7	VOC
8	FEET
9	HCl
10	NH3
11	H2
12	ClO2
13	HCN
14	F2
15	HF
16	CH2O
17	NO2
18	O3
19	INCHES
20	4-20
21	Not Specified
22	C°
23	F°
24	CH4
25	NO2
26	PH3
27	HBr (Firmware 6.0.8)
28	EIO (Firmware 6.0.8)

29	CH3SH (Firmware 6.0.8)
30	AsH3 (Firmware 6.0.8)
31	R410A (Firmware 6.0.8)
32	R1234yf (Firmware 6.0.8)
33	R32 (Firmware 6.0.8)
34..N	Future Gases