



Refrigerant Leak Monitor

System Controller for MVR-300 Gas Detectors



User Manual

CR: 800000062293
Order No.: 1100-2184/02

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SECTION 1. INTRODUCTION

1.1 About this Manual

Thank you for investing in a Bacharach MVR-SC Refrigerant Leak Monitor. To ensure operator safety and the proper use of the controller, please read the contents of this manual for important information on the operation and maintenance of the instrument.

1.2 Iconography

Alert	Icon	Description
Danger		An imminently hazardous situation which, if not avoided, will result in death or serious injury.
Warning		A potentially hazardous situation which, if not avoided, could result in death or serious injury.
Warning		Potential electrical shock hazard which, if not avoided, could result in death or serious injury.
Caution		A potentially hazardous situation which, if not avoided, could result in physical injury or damage to the product or environment. It may also be used to alert against unsafe practices.
Important		Additional information on how to use the product.

1.3 General Safety Statements



DANGER: This product HAS NOT been designed for use in hazardous locations. Failure to comply may result in personal injury or death.



WARNING: NEVER connect the product's 24V DC inputs directly to AC power supply.



WARNING: DO NOT apply power until all wiring has been completed.



CAUTION: The protection provided by this product may become impaired if it is used in a manner not specified by the manufacturer. Modifications to this instrument, not expressly approved, will void the warranty.



CAUTION: DO NOT continue to use this equipment if there are any symptoms of malfunction or failure. In the case of such occurrence, de-energize the power supply and contact a qualified repair technician or the nearest Bacharach Service Center.



IMPORTANT: Before using this product, carefully read and strictly follow the instructions in the manual. Ensure that all product documentation is retained and available to anyone operating the instrument.



IMPORTANT: The MVR-SC must be installed by a suitably qualified technician who will install this unit in accordance with these instructions and the standards in their industry / country. This document is only intended as a guide, and the manufacturer bears no responsibility for the installation or operation of this unit.



IMPORTANT: Comply with all local and national laws, rules, and regulations associated with this equipment. Operators should be aware of the regulations and standards in their industry / locality for the operation of the MVR-SC.

SECTION 2. PRODUCT DESCRIPTION

2.1 Product Overview

The MVR-SC Refrigerant Leak Monitor provides centralized control and alarming for multi-occupant applications utilizing a network of up to one hundred MVR-300 Refrigerant Leak Detectors. The MVR-SC continuously monitors all connected devices for alarm and fault conditions and will provide alerts via the integrated color touchscreen and built-in relays.

The MVR-300's core functions include monitoring a network of connected MVR-300 refrigerant leak detectors for high or low PPM alarm events, hardware faults, and network connectivity. When an alarm is present, the MVR-SC activates the alarm relay, the Home Screen switches to red, and an audible buzzer is activated. Faults activate the fault relay, the Home Screen switches to amber, and an audible buzzer is activated. Lastly, communication errors switch the Home Screen to blue and provides an onscreen warning of the effected MVR-300 Refrigerant Leak Detectors.

2.2 Design Features

- At-a-glance visualization of whole system alarm, fault, or connectivity status
- Integrates the MVR-300; centralized control for multi-occupant applications utilizing the MVR-300 refrigerant detector
- Continuously monitors all connected MVR-300 detectors for alarm and fault conditions, ensuring and warning in case of any disconnect
- Displays real time data from all gas detectors in the system and offers simple configuration of controller
- Integrated audible buzzer
- Red/Yellow/Green encoding on touch screen for clear alerting
- 1 Alarm Relay; 1 Fault Relay; Automatic system action to be taken for fault or alarm condition via built-in relays
- Relay outputs can trigger a horn/strobe that triggers during alarm and/or fault condition. NC and NO options supported.
- Rolling event log of 100 most recent events; alarms, faults, connectivity, etc.} Saved to SD card for portable export.
- Local alarm buzzer can be muted/acknowledged for 30 minutes with a single click. Remote location alarm will continue to alert until problem is assessed and resolved.
- Maintenance mode inhibits for 30 minutes any relay activation and/or audible alarming for entire system.
- Low-voltage 24VDC solution allows for concern-free wiring of communication network
- Kitted 6-inch Modbus wire harness for faster installation of MVR-300
- Up to 100 devices connected into a single network, grouped into manageable blocks with up to 15 MVR-300 refrigerant detectors per gateway.

2.3 Bill of Materials

Included

Item	Part Number
MVR-SC Refrigerant Leak Monitor	6702-8010
Modbus EZ-Wire Kit	1100-2190
USB Drive w/ Floorplan Datasheet, MVC-SC Firmware	1100-2148

Recommended

Item	Part Number
Modbus Gateway	1100-2198
Ethernet Switch	1100-2198
Modbus Cable (1,000 FT)	1100-2193

2.4 Specifications

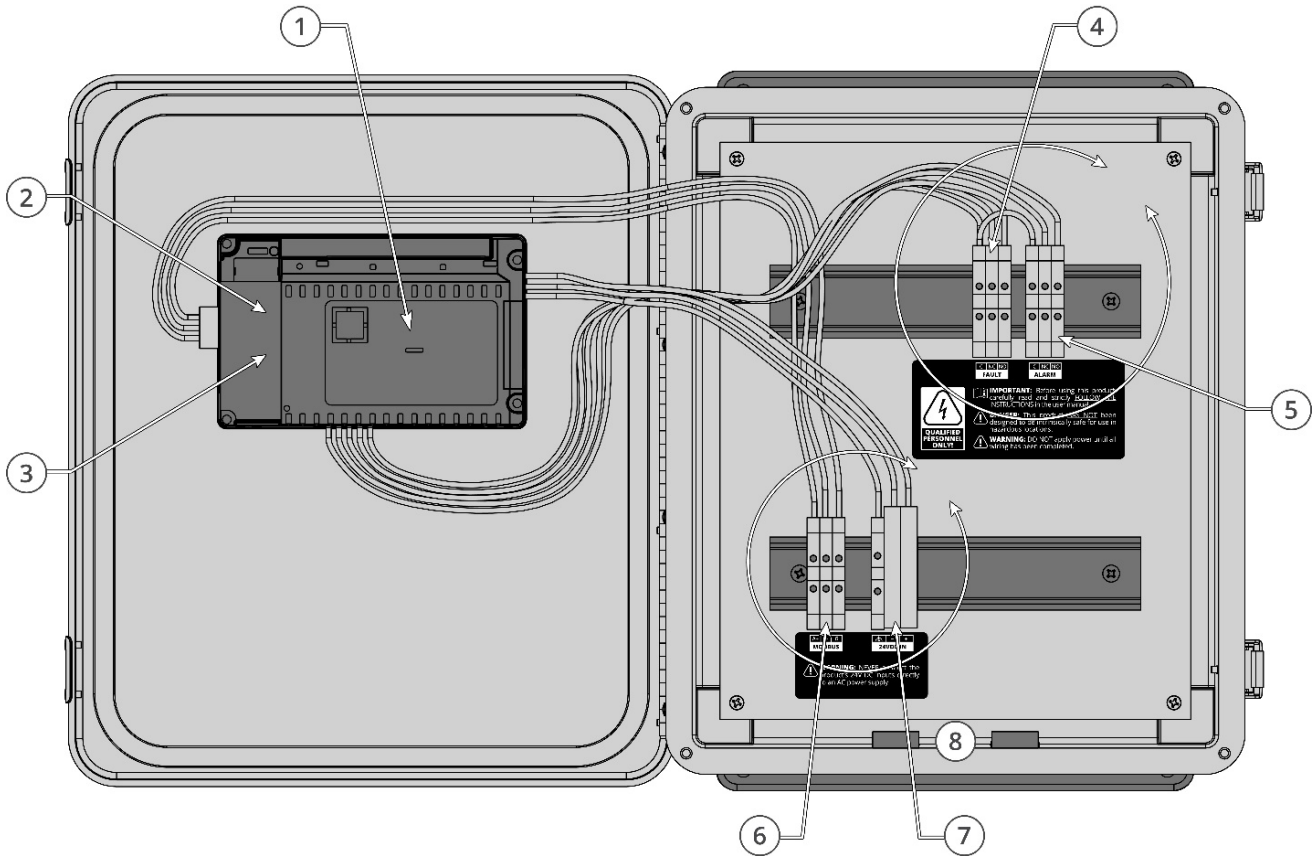
2.4.1 Hardware Specification

Housing	Fiberglass Reinforced Polyester, Wall Mount, Single-door
Dimensions	13.56 × 11.43 × 5.46 inches (344 × 291 × 139 mm)
Weight	7.8 lb. (3.54 kg)
Display Type	Color Touch Display, Resistive Analog, TFT
Mounting	Integral Mounting Flange
Latch Type	(2) quick-release latches, padlockable
Display Viewing Size	5 inch, 800 × 480 pixels
Audible Alarm	Integrated
Relay Outputs	2 (Fault, Alarm), 2.0 Amps switching current, max 250VAC / 30 VDC
Device Capacity	100 MVR-300 VRF refrigerant leak detectors 15 MVR-300 VRF refrigerant leak detectors / Gateway 7 Gateways / MVR-SC refrigerant leak monitor
Serial Port	1 × RS485 Modbus RTU Master (for direct addressing)
Memory Storage	microSD Card and USB 2.0, up to 32GB; Data Speed: up to 200Mbps
Internal Memory	RAM: 512MB; ROM: 3GB system memory; 1GB user memory
Backup Battery	CR2032 (Real-time Clock)
Operating Voltage	24V DC, 20.4VDC to 28.8VDC
Max. Current Consumption	0.44A @ 24VDC
Operating Temperature	-20° C to 55° C (-4° F to 131° F)
Storage Temperature	-30° C to 70° C (-22° F to 158° F)
Relative Humidity	5% to 95%
Enclosure Rating	IP20
Approvals	EN 61326-1:2013, RoHS Compliant, REACH Compliant

2.4.2 Network Specifications

Scan Time	15 seconds
Network Device Timeout	5 minutes
Ethernet Communication	RJ45 port, 10/100 Ethernet: Modbus TCP Master
Modbus Network Addresses	Available Gateway IP Addresses: 192.168.0.1 - 192.168.0.10 Controller IP Address: 192.168.0.100 Subnet Mask: 255.255.255.0
Modbus RTU Parameters	Baud Rate: 9,600 Start Bits: 1 Data Bits: 8 Parity: None Stop Bits: 1
Modbus ID's	2 - 16
Device Capacity	Modbus TCP : 100 Serial Port (RS485): 15

2.5 Components



#	Component Description
1	PLC / Touch Screen
2	USB Port
3	Ethernet Port <i>(Requires Shielded Cat 6 Cable)</i>
4	Fault Relay <i>(250 VAC / 30 VDC, 2.0 AMP)</i>
5	Alarm Relay <i>(250 VAC / 30 VDC, 2.0 AMP)</i>
6	Modbus Terminal Block <i>(Requires Belden 3106 or Equivalent. Shielded 1.5 pair twisted)</i>
7	Power <i>(24 VDC IN)</i>
8	Cable Entries <i>(×4, Ø 0.87)</i>

2.5.1 Network Components

MVR-SC Refrigerant Leak Monitor (6702-8010, included)

The MVR-SC Refrigerant Leak Monitor provides centralized alarming and control for all connected MVR-300 Gas Detectors.

In combination with the other network components, the MVR-SC becomes a hub of information tied to a refrigerant leak detection network.



MVR-300 VRF Refrigerant Leak Detector (6203-00XX)

The MVR-300 VRF Refrigerant Leak Detector (MVR-300) provides refrigerant leak detection for occupied rooms in VRF applications.

See MVR-300 manual PN #6203-9000 for more details.



Ethernet Network Switch (1100-2172, MOXA EDS-208A)

An Ethernet network switch is used to provide connectivity between the MVR-SC Controller and the individual Modbus Gateways (up to 8 ports).

Visit MOXA website (www.moxa.com) for more details.



Modbus Gateway (1100-2198, MOXA MGate MB3170)

A RS485 to Ethernet gateway is used to create small networks of MVR-300 Refrigerant Detectors (up to 15 per gateway) to ease installation and troubleshooting.

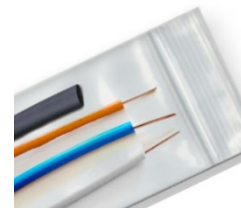
Visit MOXA website (www.moxa.com) for more details.



Modbus EZ-Wire Kit (1100-2190, included)

Precisely stripped, pre-bonded wire provides faster, more consistent installation to the MVR-300 Modbus port.

The kit includes (3) 6" 0.5mm² (20 AWG) color coded (Blue, Orange, White) wires and 2" of heat shrink.



SECTION 3. NETWORK OVERVIEW

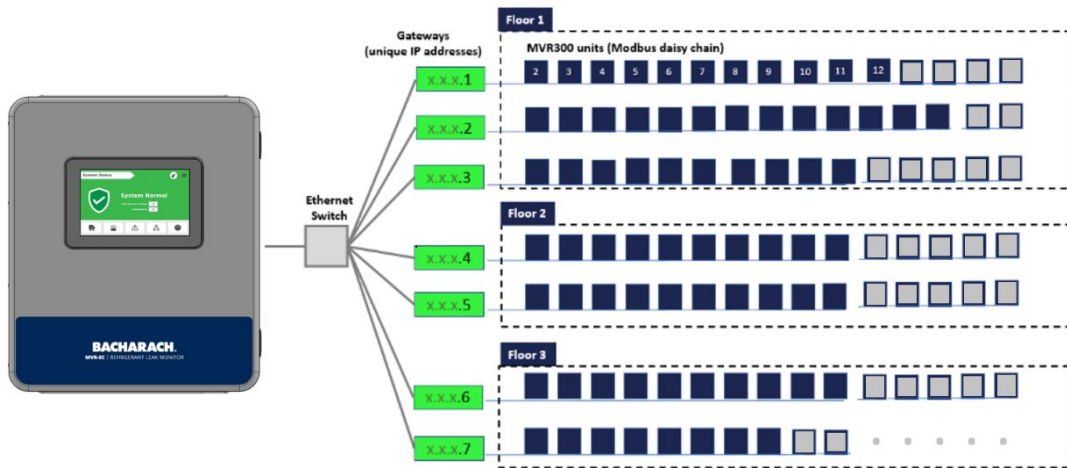


IMPORTANT: Prior to installation, download the MVR-SC floorplan spreadsheet available on the USB stick supplied with the controller and on the Bacharach website (<https://bit.ly/3nZJTIL>). This spreadsheet has editable fields for Floor / Room and non-editable fields for Modbus ID and Gateway IP address. The floor and room fields are to be completed prior to installation in order to ensure correct wiring and function.



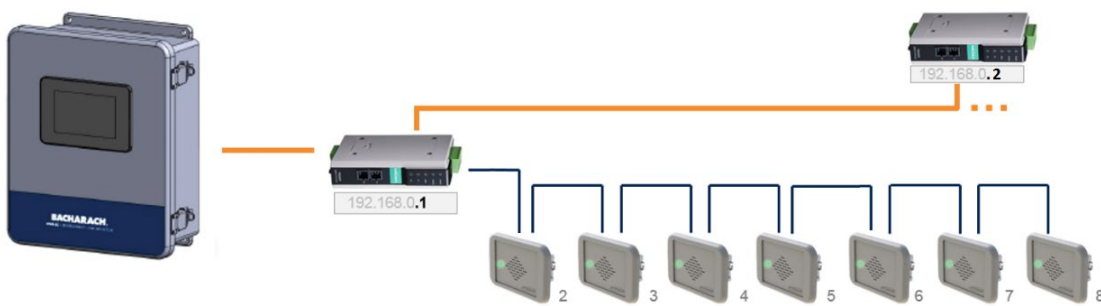
Up to one hundred MVR-300 detectors can be connected to the MVR-SC. The detectors are grouped in Modbus RTU daisy-chain segments of up to fifteen devices terminating at a gateway; up to seven gateways can be used in a fully populated network.

Gateways are connected via an Ethernet TCP network through an Ethernet switch to the MVR-SC. The MVR-SC provides centralized control of all devices in the network.



Fully Populated Network

Alternatively, the MVR-SC can also utilize a network of daisy chained gateways to populate the network instead of using an Ethernet switch as a go-between for the MVR-SC and the network's gateways.



Daisy Chained Gateway Network

A small network of up to 15 MVR-300 detectors can be directly wired to the MVR-SC via the available Modbus Terminal Block in the controller's enclosure. Combination of direct wired and gateway wired MVR-300 detectors can be deployed in a network.

MVR-SC™ Refrigerant Leak Monitor

When laying out your network based on the occupied space's floorplan, follow these recommendations:

- Keep daisy-chain segments of MVR-300 detectors as near as possible to the gateway to which they connect.
- We recommend keeping the distance under 500 ft.(152 m) for Modbus daisy-chain segments and 328ft (100 m) for Ethernet segments. As wire length increases, noise may be introduced into the system causing a communications error. A greater degree of attention to shielding and grounding is required as wire length increases.
- It is important that the designations in the floorplan spreadsheet match the physical network. Any changes in the physical wiring must be reflected in the spreadsheet for the system to function properly.

Networking Notes:

- When designating multiple devices to the same floor, those devices must have the same floor name. The MVR-SC will display a new floor for each unique name appearing in the floorplan spreadsheet, up to sixteen distinct values.
- When identifying floors/rooms on your floorplan, limit the number of characters to any combination of up to six letters or numbers.
- Each Gateway's IP Address must be unique. If only one gateway is used, its IP address should be 192.168.0.1. The IP address for subsequent gateways would be 192.168.0.2, 192.168.0.3, etc.
- The 7th gateway, if used, has a limit of ten devices. All other gateways have a limit of fifteen devices.

SECTION 4. INSTALLATION

4.1 Warnings & Cautions



WARNING: *Electrical installation should be performed by a certified electrician, and should comply with all applicable NEC / CEC and local electrical safety codes.*



CAUTION: *Drilling holes in the MVR-SC Refrigerant Leak Monitor enclosure may damage the unit and will void the warranty. Please use provided cable entries for electrical connections.*



CAUTION: *The MVR-SC Refrigerant Leak Monitor contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.*



CAUTION: *RS-485 cable must be insulated to the highest voltage level in the system.*



IMPORTANT: *Place the MVR-SC in an indoor setting free from the risk of exposure to water, high humidity or any hazardous conditions.*



IMPORTANT: *Ensure that the MVR-SC's touch screen is readily accessible for viewing alerts and responding to alarm conditions.*

4.2 Preliminary Inspection

The MVR-SC Refrigerant Leak Monitor has been thoroughly inspected and tested prior to shipment from the factory. Nevertheless, it is recommended that the controller is re-checked prior to installation. Inspect the outside of the enclosure to make sure there are no obvious signs of shipping damage. Open the enclosure door. Visually inspect the interior of the enclosure for loose wires or components that may have become dislodged during shipment. If damage is discovered, please contact a qualified repair technician or the nearest Bacharach Service Center for assistance.

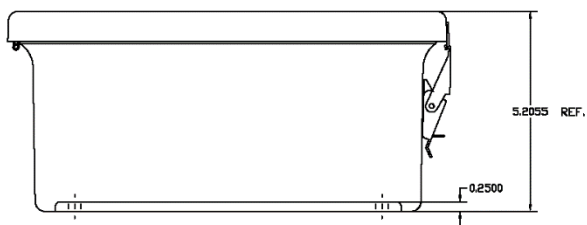
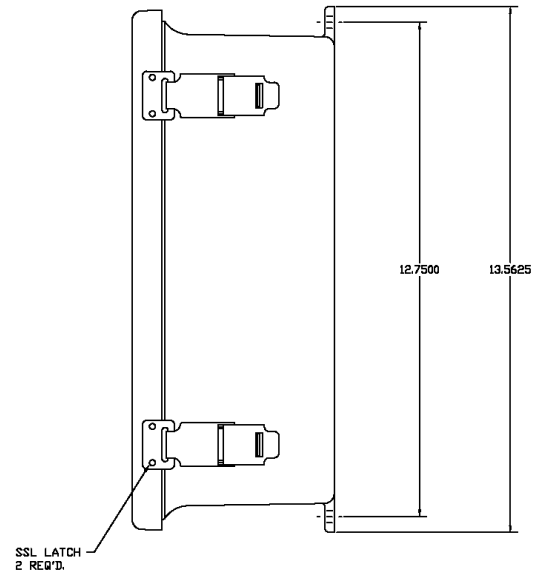
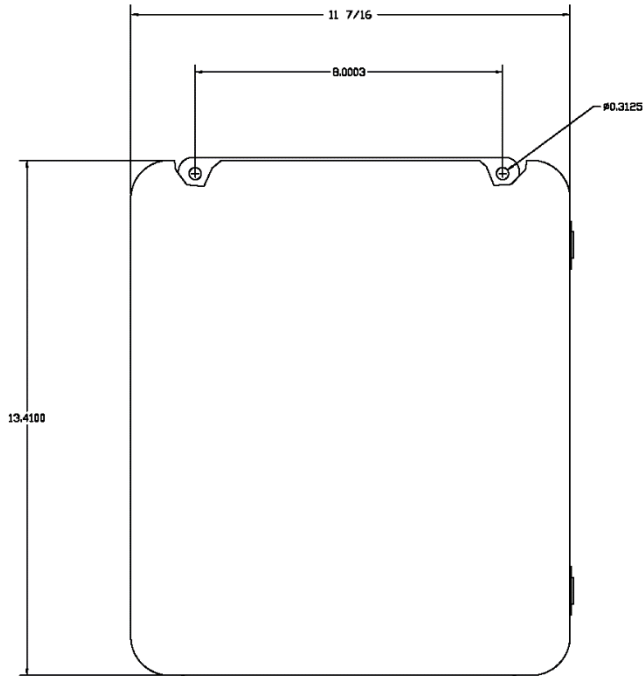
4.3 Suitable / Appropriate Locations

The MVR-SC Refrigerant Leak Monitor is design for use in a large refrigerant leak monitoring network in an occupied space. The controller should be located where it is easily accessible for visual monitoring and servicing.

The controller must be installed indoors in a clean, dry area that is not subject to temperature or humidity extremes. The location should be a low traffic area where unauthorized access is prohibited.

4.4 Mounting Instructions

The MVR-SC is equipped with an integral mounting flange. Four fasteners will be required. The mounting holes are \varnothing 0.3125" each. When mounting, take into account the degree of accessibility required for maintenance purposes when selecting a location. With the door open, the MVR-SC measures 22.5" W.



4.5 Electrical and Communications Wiring



WARNING: Ensure wiring for relays and leak detectors are made before applying power.



WARNING: Failure to ground electrical and communications wiring may result in communication errors. MVR-SC power source and Modbus Gateway power source should be two separate sources to prevent communication issues due to grounding.

Electrical Wiring

1. Locate the 24VDC Power Terminals (#7, Section 2.4) in the lower left of the MVR-SC enclosure.
2. Remove the desired plug (#8, Section 2.4) from the bottom of the enclosure.
3. Insert wires into the enclosure.
4. Secure the wires in each terminal. The Power +/- terminals accept 20 – 8 AWG (0.50 – 10 mm²) wire and require 0.59 – 1.18 ft-lb (0.8 – 1.6 Nm) of torque. The Power ground terminal accepts 22- 10 AWG (0.2 – 4 mm²) wire and requires 0.37 ft-lb (0.5Nm) of torque.
5. Remove all excess cable from the enclosure.

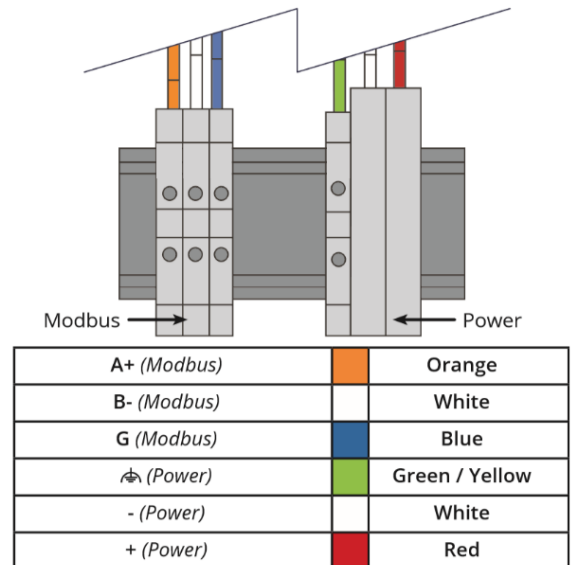
Communications Wiring

To get the most out of your MVR-SC, utilize the Ethernet port found on the PLC to interface with your MVR-300 network via the available Modbus Gateway(s) (1100-2198) and Ethernet Switch (1100-2172).

1. Locate the Ethernet port (#3, Section 2.4) found on the left-hand side of the PLC (#1, Section 2.4)
2. Remove the desired plug (#8, Section 2.4) from the bottom of the enclosure.
3. Insert the cable into the enclosure.
4. Secure the cable in the Ethernet port.
5. Remove all excess cable from the enclosure.

The integral Modbus terminals can be used for troubleshooting or a direct-connected network of up to 15, daisy chained, MVR-300 detectors.

1. Locate the Modbus terminals (#6, Section 2.4) in the lower left of the MVR-SC enclosure.
2. Remove the desired plug (#8, Section 2.4) from the bottom of the enclosure.
3. Insert wires into the enclosure.
4. Secure the wires in each terminal. The Modbus terminals accept 22 - 12 AWG (0.5 – 2.5 mm²) wire and require 0.4 Nm of torque.
5. Remove all excess cable from the enclosure.



4.6 Relay Wiring



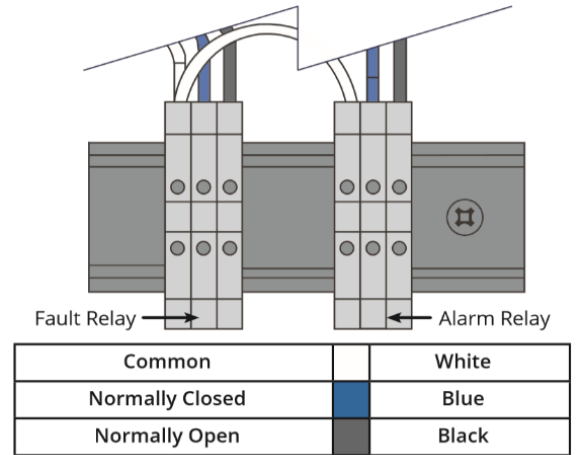
WARNING: Relays are rated for 2.0 Amps switching current, max 250VAC / 30 VDC



IMPORTANT: Take care to ensure proper wiring for intended function: normally open and / or normally closed.

The MVR-SC is equipped with (2) dry contact relays: (1) for faults and (1) for alarms.

1. Locate the fault relay terminals (#4, Section 2.4) and alarm relay terminals (#5, Section 2.4)
2. Remove the desire plug (#8, Section 2.4) from the bottom of the enclosure.
3. Insert wires into the enclosure.
4. Each relay can be wired for either normally open or normally closed operation. Secure the wires to the appropriate terminals. The relay terminals accept 22 - 12 AWG (0.5 – 2.5 mm²) wire and require 0.4 Nm of torque.
5. Remove all excess cable from the enclosure.



4.7 Connecting Modbus Gateways (1100-2198, MOXA MGate MB3170)



IMPORTANT: If multiple gateways are in use, their Ethernet ports may be daisy chained or an optional Ethernet switch can be used to connect all gateways and the MVR-SC controller



IMPORTANT: For additional gateway installation instructions, please reference the Moxa MB3000 Gateway User's Manual (<https://bit.ly/34QmP1k>)



Each gateway can support a maximum of fifteen MVR-300 detectors connected in a daisy chain fashion using 3-wire Modbus network cable. Leave no more than 12" (30.5 cm) for the single wire tie-off to each MVR-300 detector. The shield cable may be left floating or tied to electrical GND at the MVR-SC only.

Electrical Wiring

Each Modbus gateway accepts 12-48 VDC and consumes 435 mA. Each gateway requires a dedicated power source.

1. Locate and remove the power terminal block from the power socket located on the top of the Modbus gateway
2. Secure the appropriately sized wires to the V1+ and V1- terminals of the terminal block.
3. Secure Ground wire, if available.
4. Reinstall the power terminal block into the power socket.



1	G (24VDC)	Green	Green
2	Do Not Use	-	-
3	Do Not Use	-	-
4	Do Not Use	-	-
5	Do Not Use	-	-
6	+ (24VDC)	Red	Red
7	- (24VDC)	White	White

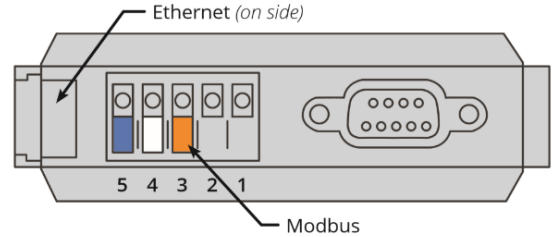
MVR-SC™ Refrigerant Leak Monitor

Communications Wiring

Secure the Ethernet cable from the MVR-SC, a Modbus Gateway, or an Ethernet Switch to one of the available Ethernet ports on the gateway

The MVR-300 gas detector utilizes RS485 communications to communicate with the MVR-SC.

1. Locate and remove the serial terminal block from the serial socket located on the bottom of the Modbus gateway
2. Secure the wires to the A+ and B- terminals of the terminal block. Reinstall the serial terminal block into the serial socket.



1	Do Not Use		-
2	Do Not Use		-
3	A+ (Modbus)	Orange	Orange
4	B- (Modbus)	White	White
5	G (Modbus)	Blue	Blue

4.8 Connecting Ethernet Network Switches (1100-2172, MOXA EDS-208A)



IMPORTANT: For additional switch installation instructions, please reference the Moxa EDS-208A switch Quick Installation Guide (<https://bit.ly/3pAyWYa>)

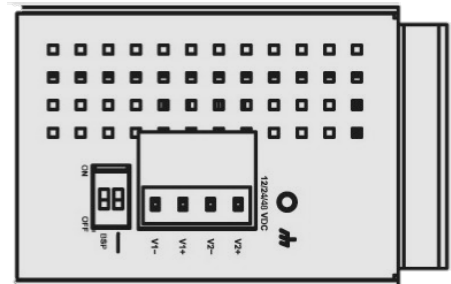


The Ethernet Network Switch can handle up to 7 Modbus Gateways. Depending on your network layout, the maximum number of gateways on the switch may be less than 7. The Ethernet Network Switch accepts standard RJ45 10/100 Ethernet cable.

Electrical Wiring

The switch accepts 12/24/28 VDC and has a maximum inrush current of 8.81A and a maximum operating current of 0.25A. The switch requires a dedicated power source.

1. Locate and remove the power terminal block from the power socket located on the top of the switch.
2. Secure the appropriately sized wires to the V1+ and V1- terminals of the terminal block.
3. Secure Ground (Ψ) wire, if available.
4. Reinstall the power terminal block into the power socket.



Communications Wiring

Secure the Ethernet cable from the MVR-SC, a Modbus Gateway, or an Ethernet Switch to one of the available Ethernet ports on the switch.

4.9 Connecting MVR-300's

i **IMPORTANT:** *Modbus Cable Recommendation: Belden 3106, 1.5 twisted pair, shielded, or similar. Daisy-chain only, minimizing the total Modbus run length for best performance. The best practice is to leave no more than 12-inches (30.5 cm) for the wire tie-off to each device.*

i **IMPORTANT:** *When inserting wire into the power and serial terminals, release the spring clamp by pushing the release latch back.*

i **IMPORTANT:** *For additional MVR-300 installation instructions, please visit the Bacharach website (<https://bit.ly/2L3bfJc>)*



Connect the first MVR-300 detector's Modbus port (3-wire) to the gateway. Subsequent MVR-300's are daisy chained together to the first MVR-300. The address to each MVR-300 detector will therefore be a combination of their Modbus ID (number 2 through 16) and the IP address of the Gateway to which they are connected.

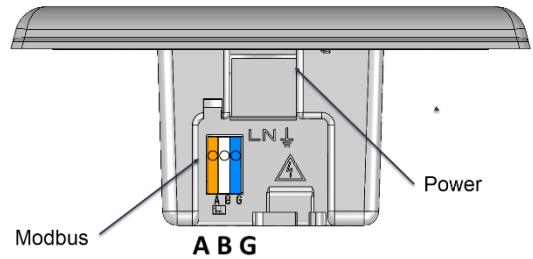
Electrical Wiring

Each MVR-300 accepts 100-240 VAC and consumes < 4W.

1. Remove bezel by releasing the two snap locks. When installed, insert coin into the slot to remove.
2. Remove cover plate by loosening the set screw.
3. Observing proper polarity, connect wires for power to the appropriate terminals (L, N, G)

Communications Wiring

Observing proper polarity, make the Modbus connections as depicted in the figure to the right.



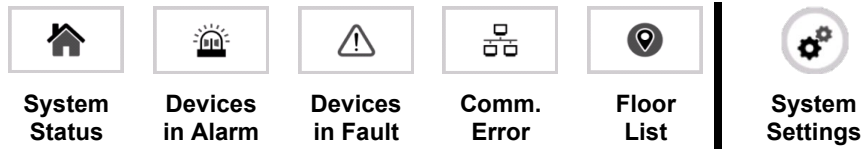
A+ (Modbus)		Orange
B- (Modbus)		White
G (Modbus)		Blue

SECTION 5. COMMISSIONING

5.1 System Overview

The MVR-SC has (6) primary screens: System Status (Home), Devices in Alarm, Devices in Fault, Communication (Comm.) Error, Floor List, and System Settings.

Most status screens can be easily navigated to by using the Navigation Icons located on the bottom of most screens. System Settings can be navigated to by utilizing the Navigation Icon located in the upper right corner of most screens.



System Status (Home) Screen

The System Status screen offers the user a quick overview of the current status of the MVR-SC and its connected network. The System Status screen is the first screen available when the MVR-SC is powered ON and warmed up.

Available System Status Screens:

System Start-Up (Gray)

Displayed out of the box and during commissioning to aid the user during network setup. This screen provides a count of: the **Total Devices In System**, the **Commissioned** devices, devices with **Comm. Error**, and the devices **Polling**.

System Normal (Green)

Displayed when there are no alarms, faults, or errors and the system is functioning properly

Alarm Detected! (Red)

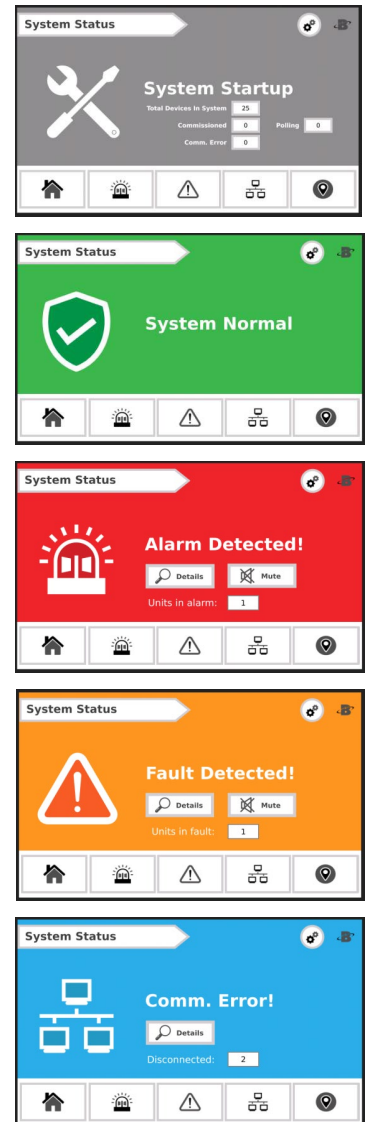
Displayed when at least one alarm is present. From this screen you can access the **Devices in Alarm** screen by pressing **Details**, silence the alarm for 30 minutes by pressing **Mute**, and view the number of **Units in alarm**

Fault Detected! (Amber)

Displayed when at least one fault is present. From this screen you can access the **Devices in Fault** screen by pressing **Details**, silence the fault for 30 minutes by pressing **Mute**, and view the number of **Units in fault**.

Comm. Error! (Blue)

Displayed when at least one communication error is present. From this screen you can access the **Comm. Error** screen by pressing **Details**, and view the number of **Disconnected** units.



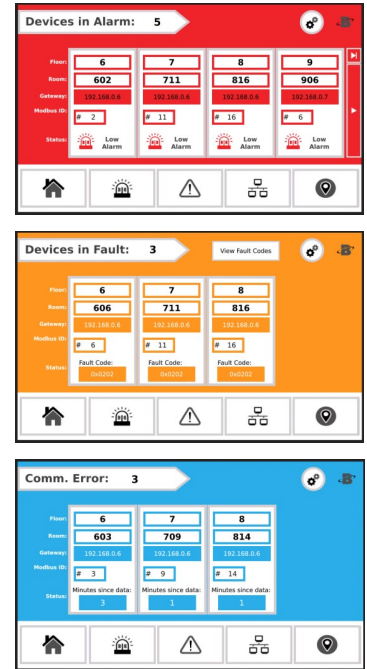
Devices in Alarm, Devices in Fault, and Comm. Error

The Alarm (Red), Fault (Amber), and Error (Blue) screens provide details on the MVR-300 detector experiencing an issue. All three screens provide physical location information (**Floor**, **Room** number), the **Gateway** (**IP address** or **Direct**) the detector is connected to, the **Modbus ID** (2 to 16), and the detectors **Status**:

Device in Alarm Status: displays detector’s active alarm (**Low Alarm, High Alarm**).

Device in Fault Status: Displays detector’s active Fault Code. (see Section XX for list of fault codes or press the **View Fault Codes** button in the top, middle of the Devices in Fault screen for a full list of faults).

Comm. Error Status: Displays **Minutes since data** was last sent/received by the MVR-SC and the MVR-300 detector with an error.



Floor List

The Floor List screen displays the **Total Device** count of the network, each **floor number** on the network, and a **status icon** as a quick user reference to any alarms, faults, or errors on a floor’s detectors.

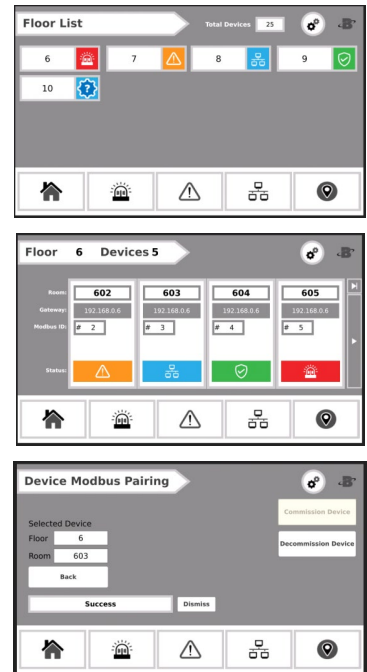
Floor/Room Status Icons:



Each floor will display the most severe detector status.

Pressing on any available floor will open the **Room/Device List** for the selected floor. The Room List displays the **Floor number**, the number of **Devices** on the floor, and each detector on the floor. For each detector on the floor, the **Room number**, **Gateway** (IP address or Direct), **Modbus ID** (2-16), and **Status** are displayed.

Pressing on any available Room status will enter the **Device Modbus Pairing** screen for that detector. See Section 5.3.2 for more details on Device Modbus Pairing.



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System Settings

The System Settings can be accessed from any primary screen.

Once the System Settings Icon is pressed, a **Passcode** screen will be displayed. System Settings are passcode protected to avoid unintentional changes. Enter the passcode for the MVR-SC controller to unlock and allow changes.

The MVR-SC passcode is 6388.

The following settings are available from the System Settings Menu: **Logout, Edit Device ID, Service Mode, Network Configuration (Config.), Event History, and Commission All**

Logout

Exits System Settings and enables Passcode

Edit Device ID

The Edit Device ID screen is utilized when manually commissioning MVR-300 detectors. See Section 5.3.3 for more details

Service Mode

The Service Mode screen allows the user to disable the Alarm/Fault sounder and relays for 30 minutes. The screen also displays **Time Remaining** when Service mode is activated. Service mode will deactivate after 30 minutes or when a power cycle is performed on the MVR-SC.

Network Configuration (Config.)

Network Configuration is utilized to upload the customer completed .CSV Floorplan Spreadsheet to the MVR-SC. When a properly format USB drive with a Floorplan Spreadsheet is inserted into the MVR-SC PLC, the user can press **Upload CSV** to upload the floorplan to be viewed on the Floor List and Room List screens. Successful will appear under the Upload CSV button, if the floorplan is successfully uploaded to the MVR-SC. The CSV file must be located in the root folder of the USB in order to perform an upload.

See Section 5.2.1 for more details on the Floorplan Spreadsheet.

Event History

The MVR-SC will save new Alarm or Fault events to the Event History. The event will be recorded with a **Timestamp, Floor** and **Room** related to the detector. The type of event will be recorded as a **Gas Low Alarm, Gas High Alarm, or a Faulted device (with Fault Code)**.

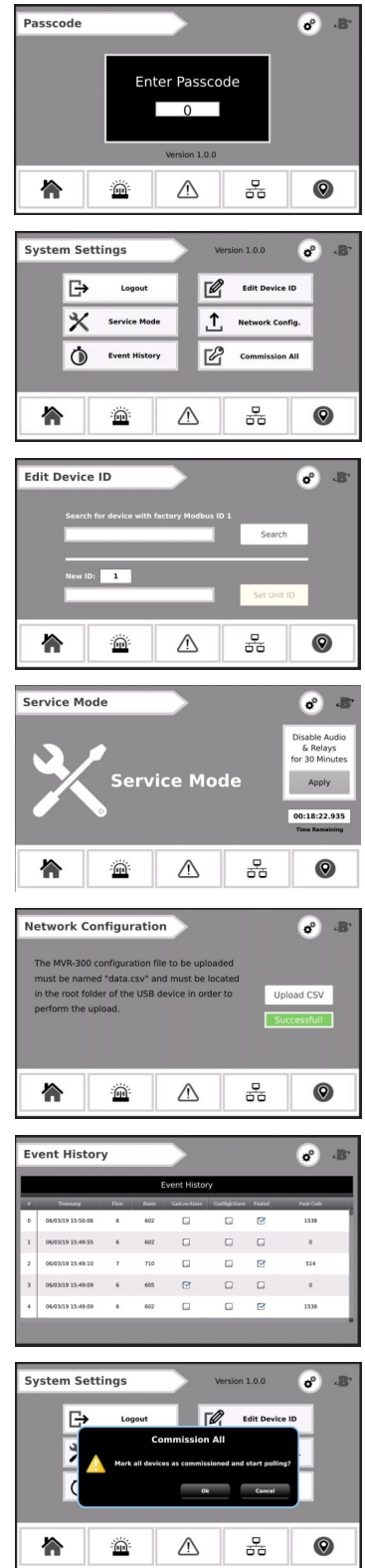
Events recorded with neither alarm nor fault are created when a device status clears to normal.

The Fault Code is stored as a decimal value and should be converted back to a hex or binary value for easier interpretation.

See Section 5.2.4 to setup the System **Time** and **Date**.

Commission All

Marks all devices as commissioned and starts polling all available devices. If all devices are not properly commissioned, this action will result in a Communications Error for every uncommissioned device that's been marked Commissioned.



5.2 Commissioning MVR-SC

5.2.1 Floorplan Spreadsheet

i **IMPORTANT:** *The use of a PC and Microsoft Excel are required to format the Floorplan Spreadsheet.*

The primary means of commissioning the MVR-SC for use is the Floorplan Spreadsheet (data.csv) found on the USB drive provided with the controller. See Section 3 for a link and QR code to the spreadsheet.

The Floor Spreadsheet consists of six columns: **Index**, **Floor**, **Room**, **Gateway**, **ModbusID**, and **IpAddress**

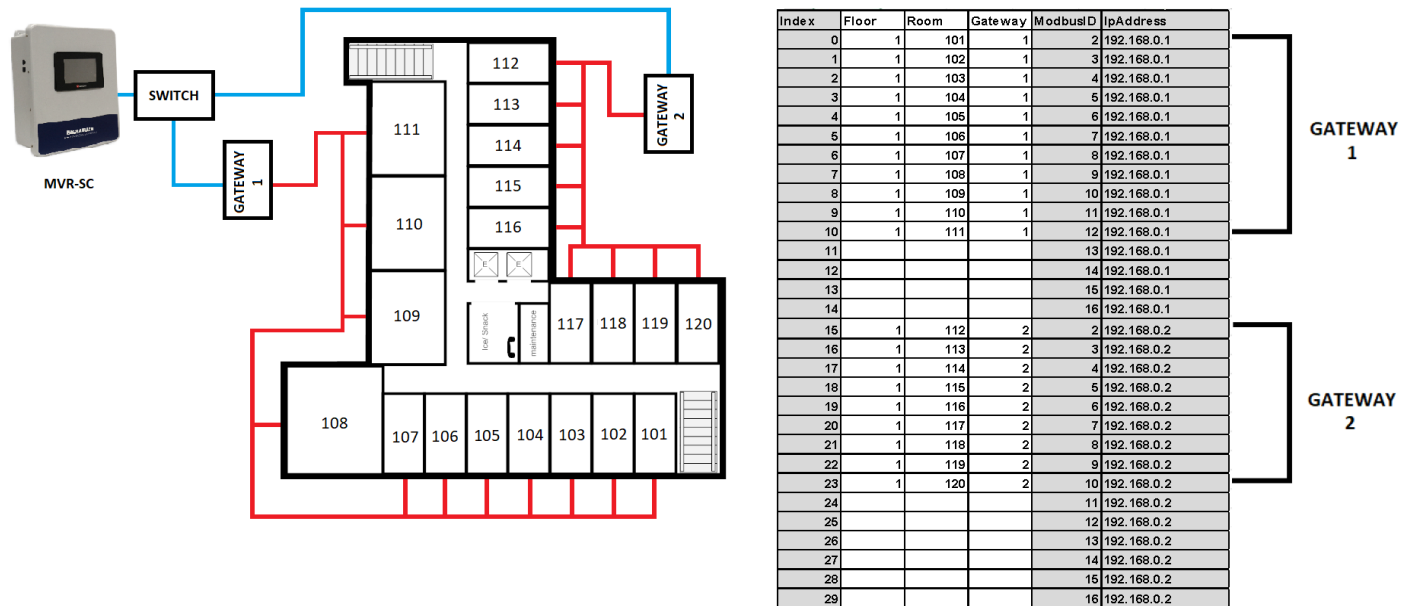
The user can edit the Floor, Room, Gateway columns. All other columns are preset and must remain untouched for proper system operation.

The Floorplan Spreadsheet must match the physical floorplan for ease of installation and operation of the system. In the example below, the buildings first floor is utilizing two gateways to monitor twenty rooms with one detector per room. The Floor column in the spreadsheet is populated with the floor of the building (Floor 1) the detectors are installed. Next, the Room column is populated with the room number the detector is installed in.

The Gateway column is optional; these inputs are not uploaded to the MVR-SC. The Gateway column corresponds to the gateway number in the example below, but it could also be the gateway location, serial number, network address, etc.

i **IMPORTANT:** *The **ModbusID** and **IpAddress**, while preset, are critical to the operation of the network. Ensure the MVR-300 detector in the designated floor and room is commissioned with the Modbus ID listed on the spreadsheet. Similarly, ensure the IP Address designated for a detector is the commissioned IP address of the gateway the detector is connected to.*

Please notice the maximum of fifteen detectors was not utilized on either gateway. The spreadsheet contains cells for all possible devices in the network, but only those with populated Floor and Room cells will be active and displayed on the controller.



When using the direct connected network of up to fifteen MVR-300 detectors to the available Modbus Terminal Block in the MVR-SC utilize Cells 104-116 (Gateway listed as "DIRECT").

w **WARNING:** *Using Index 0 in the floorplan spreadsheet may result in communication issues. It is recommended to start with Index 1, if Index 0 isn't needed.*

5.2.2 Floorplan Spreadsheet Setup



IMPORTANT: See Section 5.2.1 for additional details on the Floorplan Spreadsheet.

The USB drive provided with the MVR-SC is key to the setup and commissioning of the controller. The drive contains a blank Floorplan Spreadsheet (data.csv) and a copy of the MVR-SC firmware.

1. Remove the USB drive from the left side of the MVR-SC PLC.
2. Insert the drive into a computer with Microsoft Excel installed.
3. Locate and open the drive using My Computer / This PC.
4. Click the “data.csv” file
5. At minimum, populate the Floor and Room columns. The Modbus ID of the row must be the Modbus ID of the MVR-300 detector for that particular Floor and Room. The IP Address of the row must be the IP Address of the gateway the detector is connected to (DIRECT for direct connected detectors).
6. Save the Floorplan Spreadsheet to the root folder of the USB drive. The file must be saved as a .CSV file and the filename must be “data.csv”. Otherwise, the MVR-SC will be unable to find the file when uploading.
7. Safely remove the drive from the computer.
8. Insert the drive back into the left side of the MVR-SC PLC.
9. Upload the floorplan to the controller using the steps outline in Section 5.3.2.

Notes:

There can be multiple gateways on a given floor and is not limited to one gateway per floor.

To have floors in numeric order, have them listed as such on the Floorplan Spreadsheet. The spreadsheet does not sort populated cells.

Every populated room on the Floorplan Spreadsheet must have a Modbus ID assigned.

Do not add text to any cells to the right of Column F and/or below Row 114. Otherwise, the MVR-SC be unable to read the file.

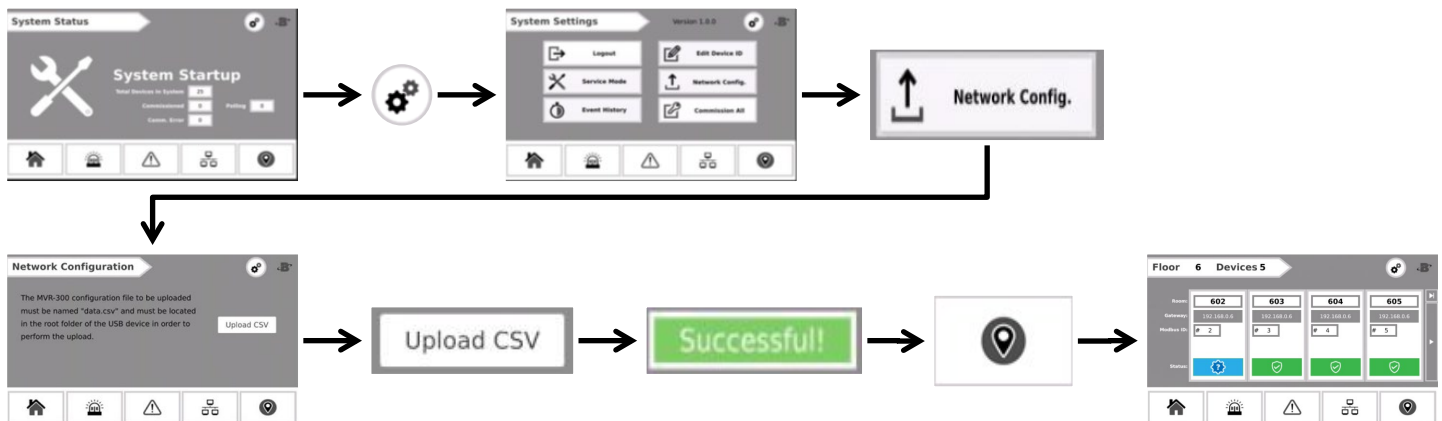
5.2.3 Upload Floorplan



CAUTION: Section 5.2.1 and 5.2.2 must be followed prior to uploading the floorplan to the MVR-SC. Failure to do so may result in an unsuccessful upload or inaccurate floorplan.



IMPORTANT: Reference Section 5.1 System Overview for more information on the screens and icons utilized.



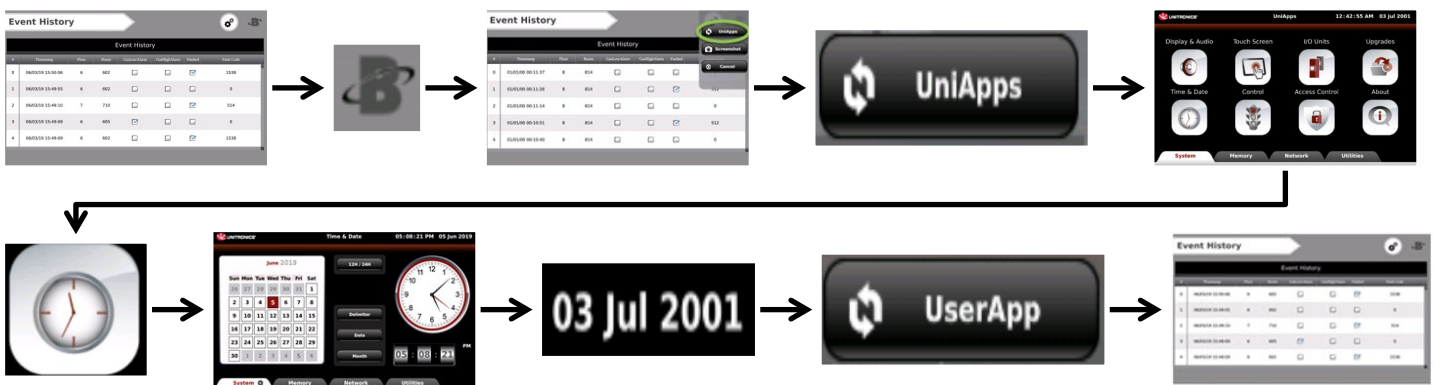
5.2.4 System Time and Date



CAUTION: Setting time and date requires access to the PLC's core system. Additional core functions are available in these menus. Altering additional parameters outside of what is described below may result in system failure and void the product's warranty. User discretion is advised.

In order to properly use the Event History System Setting described in Section 5.1 the system time and date must be set.

1. From any primary screen, press and hold the “B” icon in the upper right corner for 3 seconds.
2. Press **UniApps** on the pop-up menu.
3. Press the **System** tab in the lower left corner
4. Press Time & Date.
5. Choose the date from the calendar tool on the left side of the screen and the time from the right side of the screen.
6. Once set, return to the primary screen by pressing and hold the upper right corner again for 3 seconds. From the dropdown menu, choose **UserApp**.



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5.3 Commissioning MVR-300's



IMPORTANT: For ease of installation, it is strongly recommended that MVR-300 detectors are commissioned prior to installation in the occupied space.

Commissioning your MVR-300 detectors requires setting the appropriate Modbus ID for each detector so it coincides with the Modbus ID assigned to it on the Floorplan Spreadsheet. Each MVR-300 detector ships with its default Modbus ID set to 1. The Modbus ID must be set to 2 -16 to operate on an MVR-SC network.

The Modbus ID can be set using one of two methods:

- **Modbus ID Auto-Assign:**
Automatically connect and set ID's using the integrated Magnetic Switch to pair each MVR-300 detector to its install location.
- **Modbus ID Manual Assign (Direct Connect):**
Use the RS485 port on the MVR-SC to manually set the Modbus IDs, and then install according to the floorplan, while keeping track of assigned Modbus IDs.



WARNING: Modbus ID Manual Assign requires the detector to start with a Modbus ID of 1. Failure to do so will result in an unsuccessful commissioning. The detectors are sent from the factory with a default Modbus ID of 1. See Section 5.3.2 to perform a factory reset on the detector, if unsure of devices current ID.



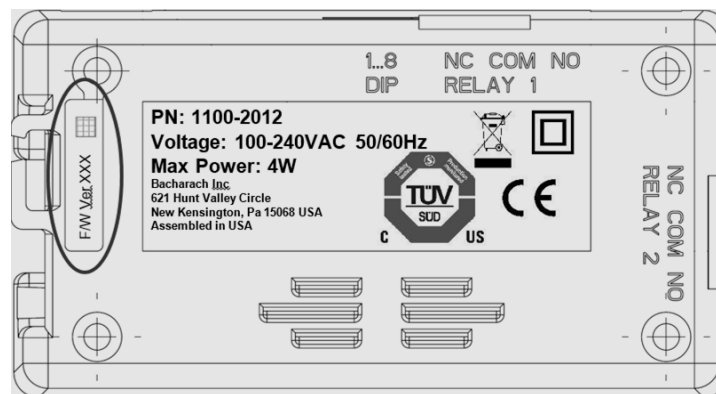
WARNING: Modbus ID Auto-Assign is not available for a network of MVR-300 detectors directly connected to the Modbus Terminal Block of the MVR-SC.



WARNING: Modbus ID Auto-Assign will not function properly on MVR-300 detectors with Firmware 001. **Modbus ID Manual Assign** must be used. This does not affect Firmware 1.1.2 or newer. See Section 5.3.1 to location the detectors firmware version.

5.3.1 MVR-300 Firmware Version

The MVR-300 firmware version is located on the back left of the MVR-300 (where "XXX" is 001, 1.1.2, etc):



5.3.2 MVR-300 Factory Reset

To reset an MVR-300 detector to its default Modbus ID of 1, follow this procedure:

Power OFF the MVR-300. Set dipswitch 8 to the ON position.

1. Power ON the MVR-300 (buzzer should sound). Reset dipswitch 8 to the OFF position (buzzer should turn off).
2. Use the MVR-300 magnet wand held to the Magnetic Switch 1 (●) of the detector for 60 seconds. The detector will beep once complete.
3. Remove the magnet wand and cycle power. The MVR-300 has been reset to factory default Modbus ID 1.



5.3.3 Method 1: Modbus ID Auto-Assign

Each MVR-300 detector can be auto-assigned its Modbus ID. This process is done one MVR-300 at a time. Ensure the MVR-300 detector to be commissioned is powered ON, connected to its Modbus gateway, and the gateway is connected to the MVR-SC.

Modbus ID Auto-Assign uses a 2-person verification technique. This process gives the added advantage of physically verifying that each connected device is correctly installed in the assigned room location.

Enter System Settings to confirm the passcode has been entered (If the passcode has not been entered, the **Device Modbus Pairing** screen will not be accessible). See Section 5.1 for more Passcode Details.

1. On the MVR-SC touchscreen, press the Floor List icon in the bottom right of the screen to advance to the Floor List.
2. Press the Floor where the detector to be commissioned is located.
3. Press the Room where the detector to be commissioned is located.

This will open the **Device Modbus Pairing** screen.

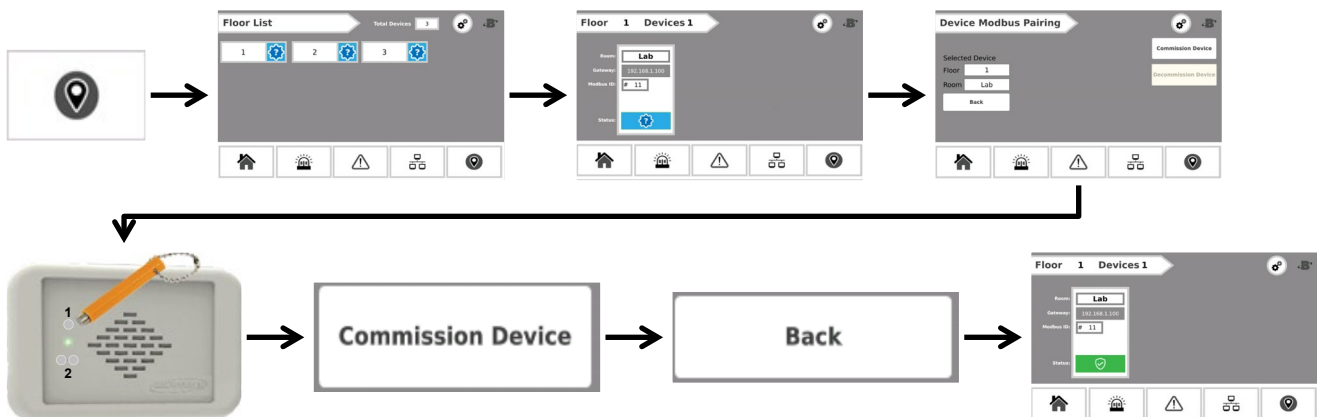
Once on the **Device Modbus Pairing** screen, have a co-worker tap Magnetic Switch 1 (●) with the MVR-300 magnetic wand on the detector for less than a second.

The detector will make an audible sound signaling that it is in Commissioning Mode.

The MVR-300 may be taken out of Commissioning Mode by briefly tapping Magnetic Switch 2 (●●).

4. Once the device has been placed into the “Commissioning Mode”, tap **Commission Device**. If the device has been successfully commissioned a “Success” message will appear. If the commissioning was unsuccessful, an “Unable to Contact Device” message will appear.
5. Once the commissioning is successful, tap the **Back** button to go back to the Floor List screen.
6. On the Floor List screen there will be a green checkmark on the detector that was just commissioned confirming the commissioning was successful.

Repeat these steps for each room on a floor and each floor in the building until all MVR-300 detectors have been commissioned.

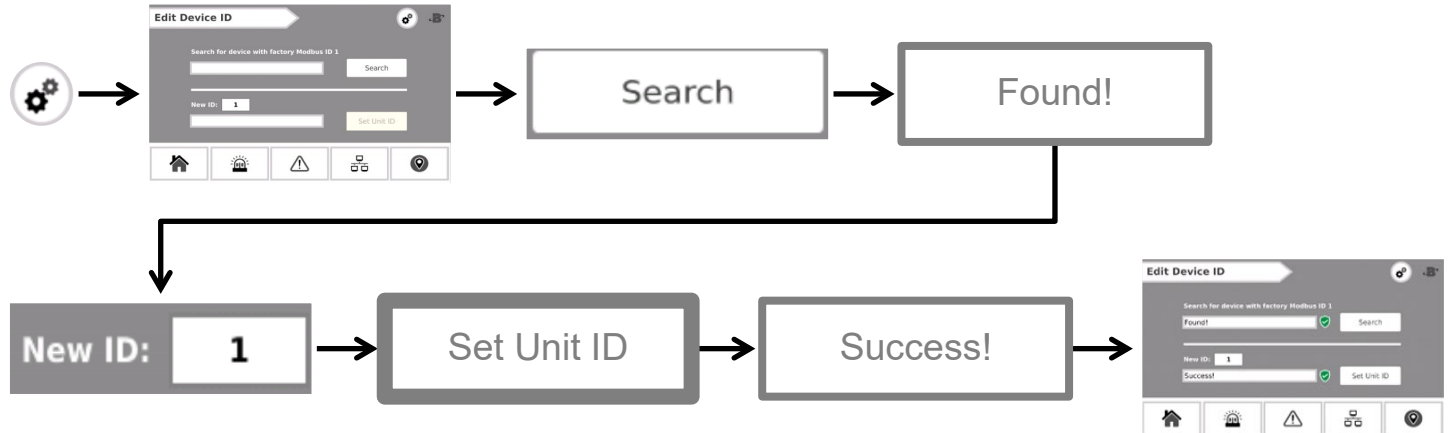


5.3.4 Method 2: Set Modbus ID Manually

Wire a single MVR-300's Modbus port to the MVR-SC Modbus terminal block. It is recommended to use the EZ-wire kit included with the MVR-SC controller for ease of commissioning.

1. From **Settings**, open the **Edit Device ID** screen to select and apply a specific Modbus ID.
2. Tap **Search** to connect to the device. If the unit does not have factory Modbus ID 1, this can be restored by performing a factory reset, see Section 5.1.1.
3. Specify a **New ID** for the MVR-300 detector. The new ID can be 2-16.
4. Tap **Set Unit ID** to apply this ID.

Repeat the above steps for each device. Keep track of the assigned IDs and install according to the floorplan spreadsheet.



5.4 Commissioning Gateways

Commissioning your Modbus Gateways requires setting the appropriate IP address for each gateway so it coincides with the IP Address assigned on the Floorplan Spreadsheet. Each gateway ships with a default IP address of 192.168.0.1. Each gateway must have its own IP address. The IP addresses for each gateway are assign it the following sequential order up to the maximum allowable seven gateways.

Order	IP for Gateway	MVR-300 device count
1	192.168.0.1	15
2	192.168.0.2	15
3	192.168.0.3	15
4	192.168.0.4	15
5	192.168.0.5	15
6	192.168.0.6	15
7	192.168.0.7	10

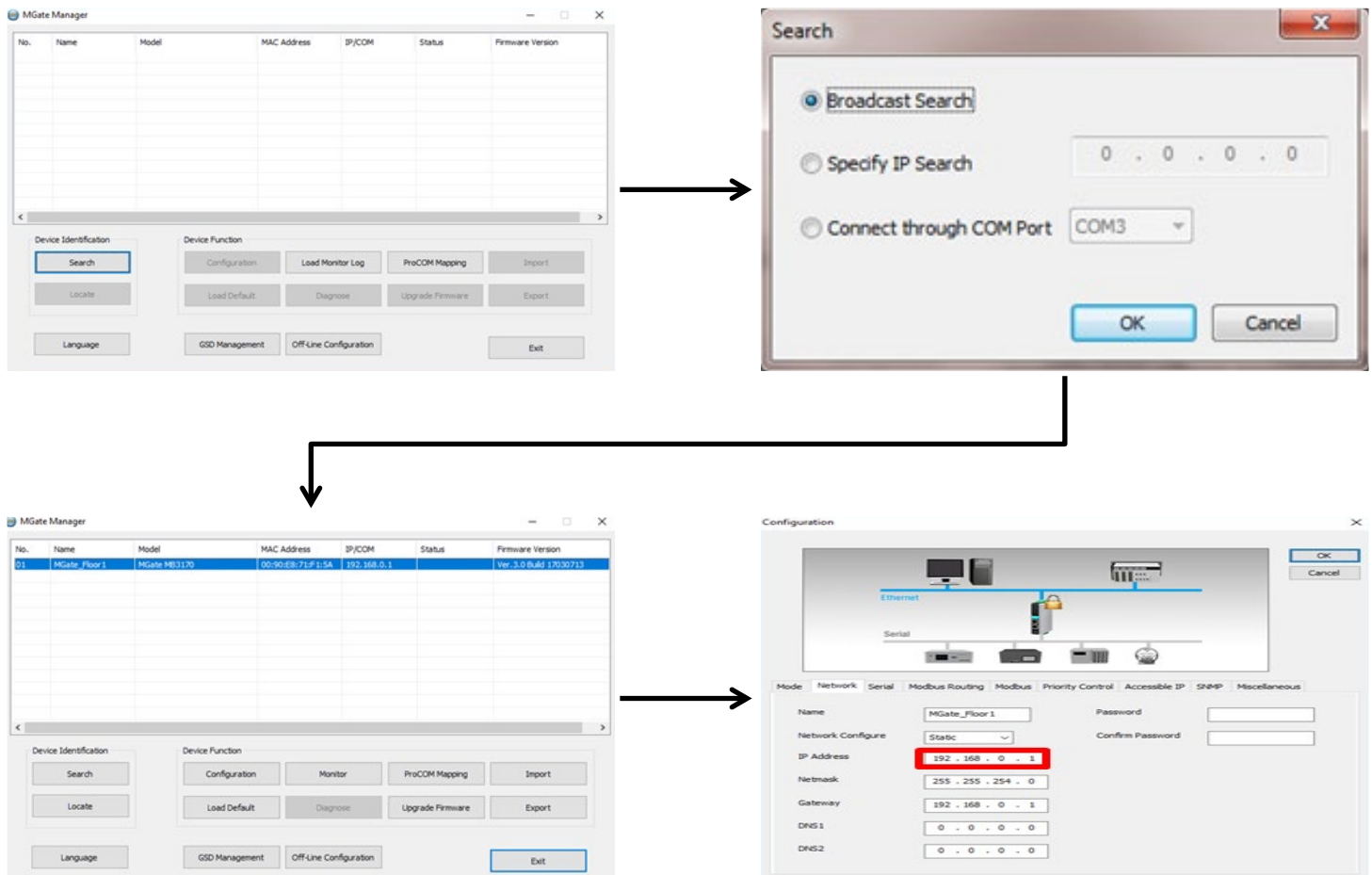
5.4.1 Change Gateway IP Address



IMPORTANT: The use of a PC and the MOXA MGate Manager (<https://bit.ly/34XpICX>) are required to change the gateway IP address.



1. Ensure the gateway is connected to 24VDC power
2. Connect the gateway to a PC using either available Ethernet port.
3. Open the **MOXA MGate Manager** application on your PC.
4. Press the **Search** Button in the lower left corner of the window to search for the connected gateway.
5. In the pop-up window, choose **Broadcast Search** to automatically discover the connected gateway and press **OK**.
6. When discovered, the gateway will show up in the table.
7. Select the gateway's row and press **Configuration** under **Device Function** in the middle of the window. If prompted, the **username is admin** and the **password is moxa**.
8. From the Configuration window, navigate to the **Network** tab (second tab).
9. In the **IP address** field, Change the IP from 192.168.0.1 to the address that corresponds with your Gateway index (1 – 7) from the chart in Section 5.4. If this gateway is the first in the network, its IP address is already correct, 192.168.0.1. If it is the second, change the last digit to match, 192.168.0.2, and so on. Press OK.
10. Repeat this process for the remaining gateways in the network.



SECTION 6. OPERATION



IMPORTANT: For more details on the System Status screens and all MVR-SC screens please see Section 5.1

Once all network components requiring commissioning (MVR-SC, gateway(s), MVR-300 detector(s)) have been successfully powered, connected, and commissioned your MVR-SC refrigerant leak monitoring network is operational.

Under normal operating conditions, the MVR-SC will display the green System Normal status on the System Status screen indicating no issues with the networked MVR-300 detectors. The switch (no commissioning required, plug and play) will have an amber P1 LED confirming power is being supplied to the unit and a green 10M/100M LED will blink periodically confirming data is being transmitted across the switch. Each gateway will have a red PWR1 LED confirming power is being supplied, a green RDY LED to confirm the power is on and the unit is functioning normally, and an amber P1 LED will blink periodically confirming the unit is receiving data from its detectors. Each MVR-300 detector's multi-color LED will be green under normal operating conditions. All Ethernet ports in the network will blink periodically confirming data is being transferred and received.

The MVR-SC controller will provide instantaneous details for any detector in the network experiencing an alarm (red), fault (amber), or communications error (blue) event.

The intuitive System Status screen will immediately change color signaling the type of event that has occur. If multiple events have occurred, the most severe will be displayed.

From the System Status screen, the user can promptly request more detail on the event, see the number of detectors experiencing the event, and, in the case of alarm and fault events, mute the local audible alarm.

SECTION 7. TROUBLESHOOTING

MVR-SC will not turn ON

- Ensure 24VDC (20.4VDC to 28.8VDC) power is supplied to the controller
- Ensure AC power is wired correctly
- Check for no loose wires on the power terminals
- Check for no loose wires on the PLC terminal block

Alarm and/or Fault Relay are not operating

- Check for no loose wires on the relay terminals
- Check for no loose wires on the PLC relay terminal block
- Ensure relay is wired correctly
- Ensure power is supplied to the relay device
- Ensure relay device is wired correctly (NO vs. NC)
- Ensure an Alarm or Fault event is occurring

SECTION 8. ADDITIONAL INFORMATION

8.1 Disposing of the Instrument

EU-wide regulations governing the disposal of electrical and electronic appliances which have been defined in the EU Directive 2012/19/EU and in national laws have been effective since August 2012 and apply to this device.

Common household appliances can be disposed of using special collecting and recycling facilities. However, this device has not been registered for household usage. Therefore, it must not be disposed of through these channels. The device can be returned to your national Bacharach Sales Organization for disposal. Please do not hesitate to contact Bacharach if you have any further questions on this issue.

8.2 Service Center Locations

Prior to shipping equipment to Bacharach, visit www.mybacharach.com for a Returned Merchandise Authorization Number (RMA #). All returned goods must be accompanied by an RMA #. Pack the equipment securely (in its original packing, if possible), as Bacharach cannot be held responsible for any damage incurred during shipping to our facility.

Location	Contact Information	Shipping Address
United States	Phone: +1 724 334 5000 Toll Free: +1 800 736 4666 Fax: +1 724 334 5001 Email: help@mybacharach.com	Bacharach, Inc. 621 Hunt Valley Circle New Kensington, PA 15068, USA ATTN: Service Department
Europe	Phone: +353 1 284 6388 Fax: +353 1 284 6389 Email: help@mybacharach.com	Bacharach, Inc. Unit D12 & D13 Santry Business Park, Swords Road Santry, Dublin, Ireland ATTN: Service Department
Canada	Phone: +1 905 882 8985 Fax: +1 905 882 8963 Email: support@bachcan.ca	Bacharach, Inc. 10 West Pearce Street, Unit 4 Richmond Hill, Ontario L4B 1B6, Canada ATTN: Service Department

