MATRIX
Engineering Safety • Advancing Automation

Matrix IntelliZone™ Proximity Detection System

Basic Information • 3rd Party

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System Warnings & Disclaimers

It is important that all users / personnel that may come into contact with the IntelliZone™ Proximity Detection System understand it's purpose. It is NOT a safety system. It is a training aid developed to teach users safe operating habits. User / Operator assumes full responsibility for control of the machine upon which the system is installed. User / Operator assumes full liability for the maintenance and operation of the IntelliZone™ Proximity Detection System.

System Warning Label

The Matrix IntelliZone™ System includes several highly visible WARNING labels located on the front of the machine-mounted Drivers, and the user-carried Locators. All users / personnel that may come into contact with an IntelliZone™ Proximity Detection System equipped machine should familiarize themselves with all WARNINGS associated with the system. Additional WARNING labels for the IntelliZone™ System are available free-of-charge as requested.

WARNING

- DO NOT USE THE PROXIMITY DETECTION SYSTEM WITHOUT PROPER TRAINING.
- IMPROPER ADJUSTMENT MAY RESULT IN FAILURE OF THE SYSTEM TO OPERATE OR OPERATE CORRECTLY.
- DISCLAIMER: USER/OPERATOR UNDERSTANDS THAT THE PROXIMITY DETECTION SYSTEM IS NOT A SAFETY SYSTEM. IT IS A TRAINING AID TO TEACH SAFE OPERATING HABITS. OPERATOR IS RESPONSIBLE FOR CONTROL OF THIS MACHINE.
- USER/OPERATOR ASSUMES LIABILITY FOR THE MAINTENANCE AND OPERATION OF THE PROXIMITY DETECTION SYSTEM.

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Objective

The intent of IntelliZone™ Proximity Detection is to provide a practical, mine-duty system that will automatically warn personnel when they are entering a potentially hazardous area around a machine. The system must be able to disable some or all machine functions if a particular zone is breached.

System Overview

The Matrix IntelliZone™ Proximity Detection System assists with training personnel to stay clear of dangerous zones present around potentially hazardous equipment. The System is designed for use on mobile equipment such as continuous miners, mobile haulage, and other light and heavy vehicles. The System is typically configured for two operational awareness zones: a "shutdown zone" (red) can be defined closest to the equipment and a "warning zone" (yellow) can be defined to extend a moderate distance from the equipment. When an IntelliZone™ Locator is detected within the red zone, the System will prompt the equipment to immediately shutdown some or all of its functions. When an IntelliZone™ Locator is detected within the yellow zone, the System will prompt the equipment to reduce its speed or influence other changes in operation. If a Locator is detected within either zone, the System will initiate highly-visible flashing lights and an audible alarm on the Locator and Drivers to warn personnel of potential hazards.

Additional IntelliZone™ awareness zones can be configured as needed and are customizable to specific equipment and applications.

WARNING

DO NOT USE THE PROXIMITY DETECTION SYSTEM WITHOUT PROPER TRAINING.

IMPROPER ADJUSTMENT MAY RESULT IN FAILURE OF THE SYSTEM TO OPERATE OR OPERATE CORRECTLY.

DISCLAIMER: USER/OPERATOR UNDERSTANDS THAT THE PROXIMITY DETECTION SYSTEM IS NOT A SAFETY SYSTEM. IT IS A TRAINING AID TO TEACH SAFE OPERATING HABITS. OPERATOR IS RESPONSIBLE FOR CONTROL OF THIS MACHINE.

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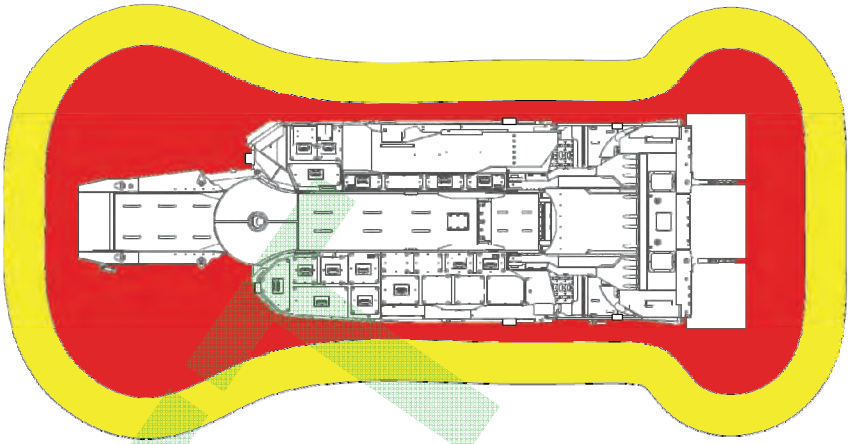
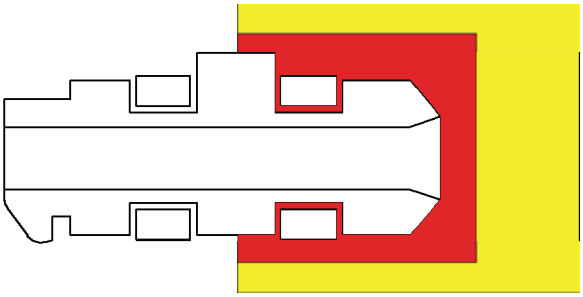
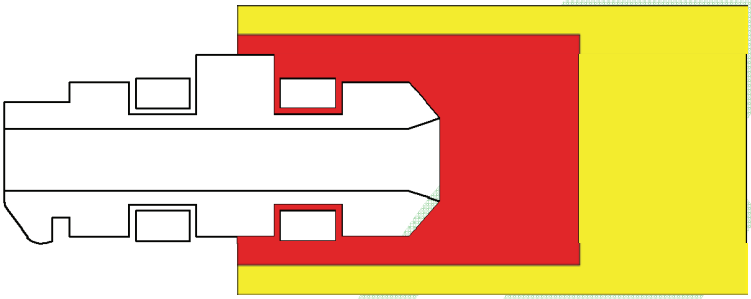
Standard Miner Configuration

Consists of a shutdown zone (red) and warning zone (yellow), as well as operator zone (green) while cutting. These zones are configurable through software.

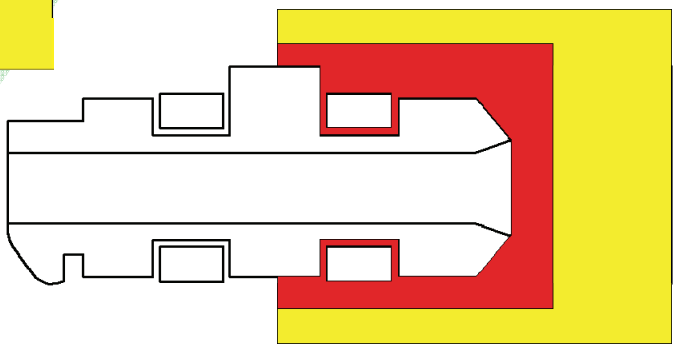






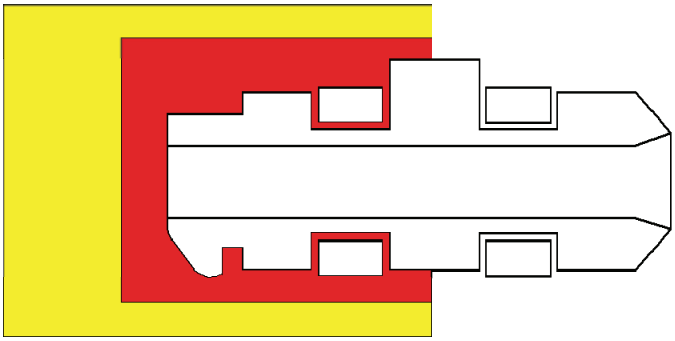
Expanding Mobile Equipment Zones

On mobile equipment, zones can be configured to expand as the machine accelerates. Oversized zones are no longer required on faster moving equipment.



Directional Mobile Equipment Zones

On mobile equipment, zones can be configured to react to the equipment's direction. This prevents the machine from being shut down by personnel walking behind it.



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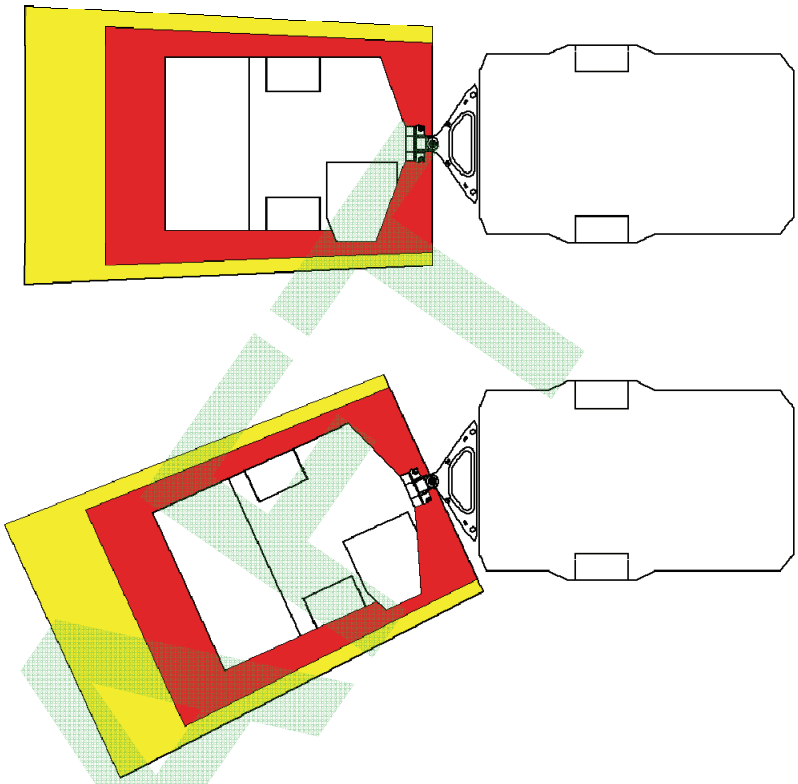
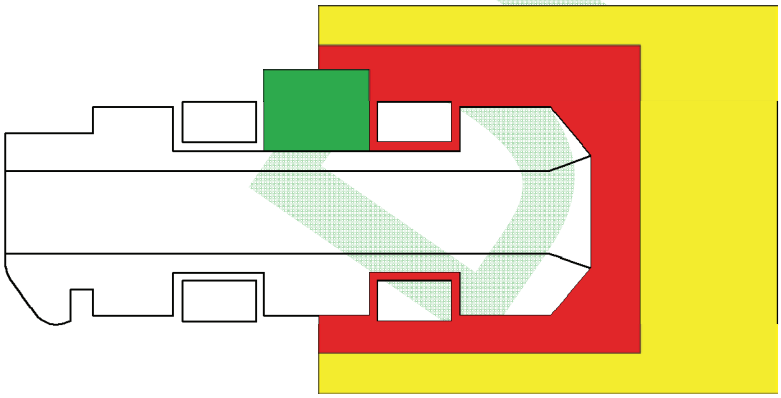
Articulating Machinery

On articulating machinery, the zones can configured to react to the pivoting of the machine. This enables the zones to remain consistent even when the machine is articulated.





Operator (Green) Zone

Operator zones can be configured using the Intellizone GUI. These operator zones are critical in that it allows the associated Locator to be in the area without shutting down the machinery.

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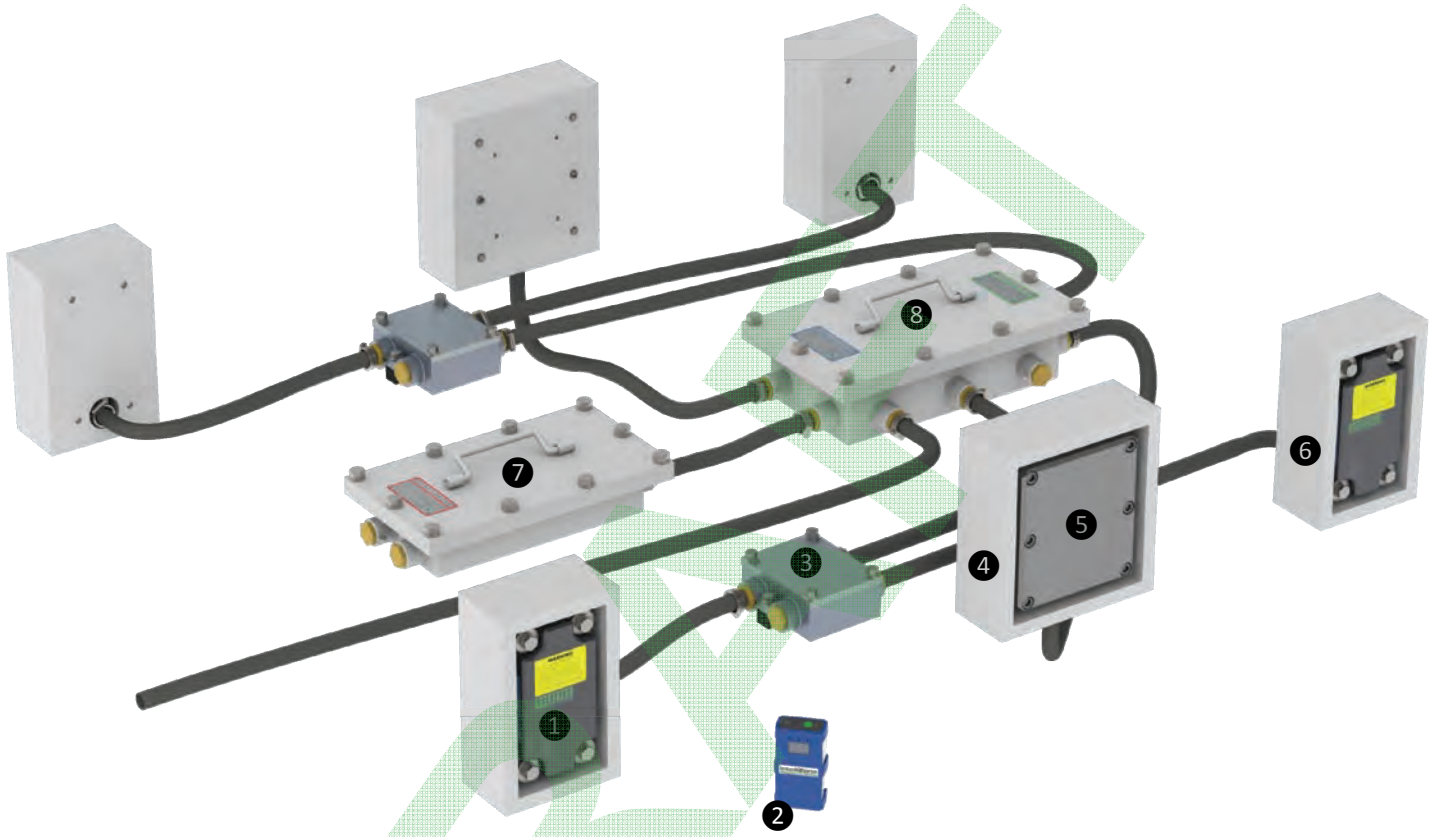
System Components

The IntelliZone™ System is approved for use in potentially hazardous MSHA-regulated environments. Below is a typical layout for a system on a machine. System components may vary in quantity and location depending on the machine upon which it is mounted.



1. MX3-IZ Driver (4 shown)
2. MX3-IZ Locator
3. MX3-IZ Splitter Box (2 shown)
4. M3-1000 Guarding (2 shown)
5. MX3-IZ Antenna Mounting Kit, Retrofit (2 shown)
6. MX3-IZ Guarding (4 shown)
7. MX3-IZ Power Supply Box
8. MX3-IZ Proximity Controller Box

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MX3-IZ Driver

The MSHA-approved Driver allows for tracking of multiple Locators. The Driver is machined from rugged polycarbonate and incorporates multi-color LEDs used for diagnostics and zone identifications.

MX3-IZ Locator

The MSHA-approved Locator is the device the operator wears and that is tracked around the machine. The Locator also has a built-in audible and visible warning. The operator uses this device to associate/dissociate. It can be worn in a pouch or using a belt clip.

MX3-IZ Controller

The Controller is the central processor for the IntelliZone™ System. It communicates to the mobile equipment and Locators and provides power to 4 machine-mounted Drivers. Personnel can connect to the Controller wirelessly (w/ adaptor) or with an Ethernet cable to adjust settings and view system diagnostics. This device IS NOT intrinsically safe and MUST be inside an explosion-proof enclosure when used in MSHA-regulated environments.

MX3-IZ Software Key

The Software Key must be installed on the Controller for the system to function. It can be moved to a new Controller in event of a failure. This stores the machine configuration and provides an Industrial Ethernet connection. The Software Key IS NOT intrinsically safe and MUST be inside an explosion-proof enclosure when used in MSHA-regulated environments.

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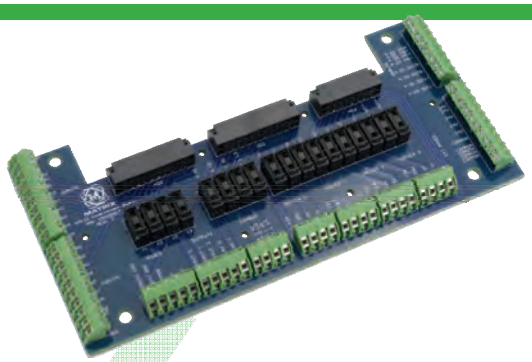
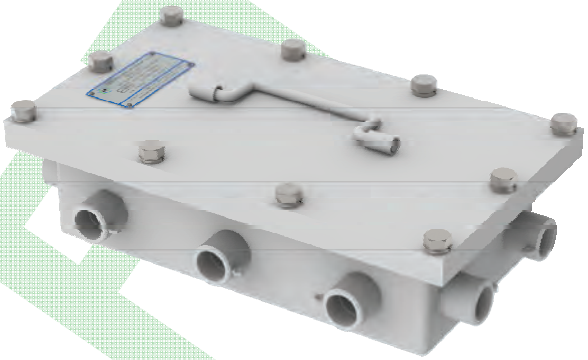
MX3-IZ Interconnect Board



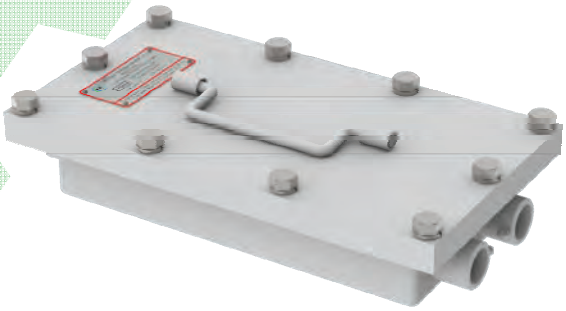
The Interconnect Board is the hub for all relays, inputs, outputs, power, etc. that interfaces to the Controller. This board mounts below the Controller and is designed for easy access to all wiring terminals. The Interconnect Board IS NOT intrinsically safe and MUST be inside an explosion-proof enclosure when used in MSHA-regulated environments.

Controller XP Box



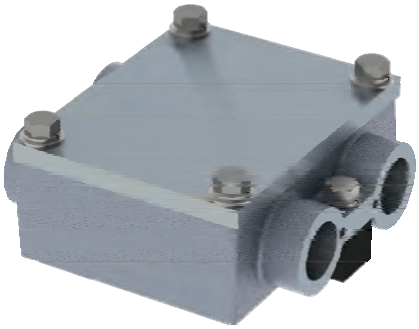
This MSHA-approved enclosure houses the Controller, Software Key, and Interconnect Board. It features 7 ports that use 1.125-12 packing gland assemblies to ensure the enclosure remains explosion proof.

Power Supply XP Box



This MSHA-approved enclosure houses the Intellizone Power Supply. It features 4 ports that use 1.125-12 packing gland assemblies to ensure the enclosure remains explosion proof.

Splitter XP Box



This MSHA-approved enclosure is used to minimize the number of Controller XP Box ports needed. Typically 2 Splitter XP Boxes are used per system; one being placed on each side of the machinery. It features 4 ports that use 1.125-12 packing gland assemblies to ensure the enclosure remains explosion proof.

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Driver Guarding

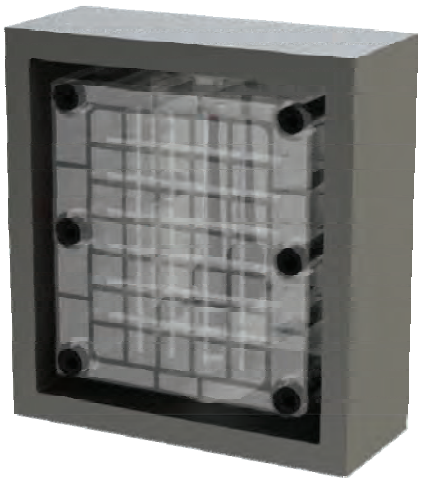
The guarding around Driver is MSHA-approved and therefore must be manufactured to specific dimensions. The outer guarding must be at minimum 1/4" thick. The backing must be at minimum 5/8'" thick. The gap between the guarding and Driver can not exceed 1/2". For more information see drawing # 10000099.

Whip Antenna Kit

This kit includes a 2.45Ghz Whip antenna, mounting hardware, polycarbonate cover, pipe nipple, and elbow for a large range of custom mounting configurations. This antenna kit is a proven design for haulage equipment such as shuttle cars and battery haulers. It requires much less room than the retrofit Antenna Kit.

Retrofit Antenna Kit

This kit includes a 2.45Ghz Whip antenna, mounting hardware, and a polycarbonate cover. It was designed to mount directly into existing guarding on equipment fitted with previous generation proximity detection systems.



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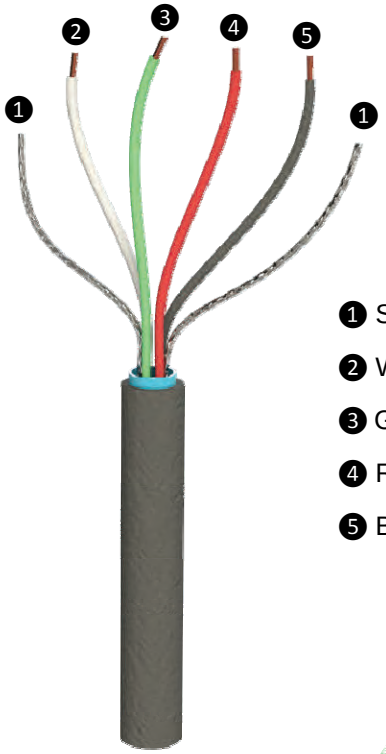
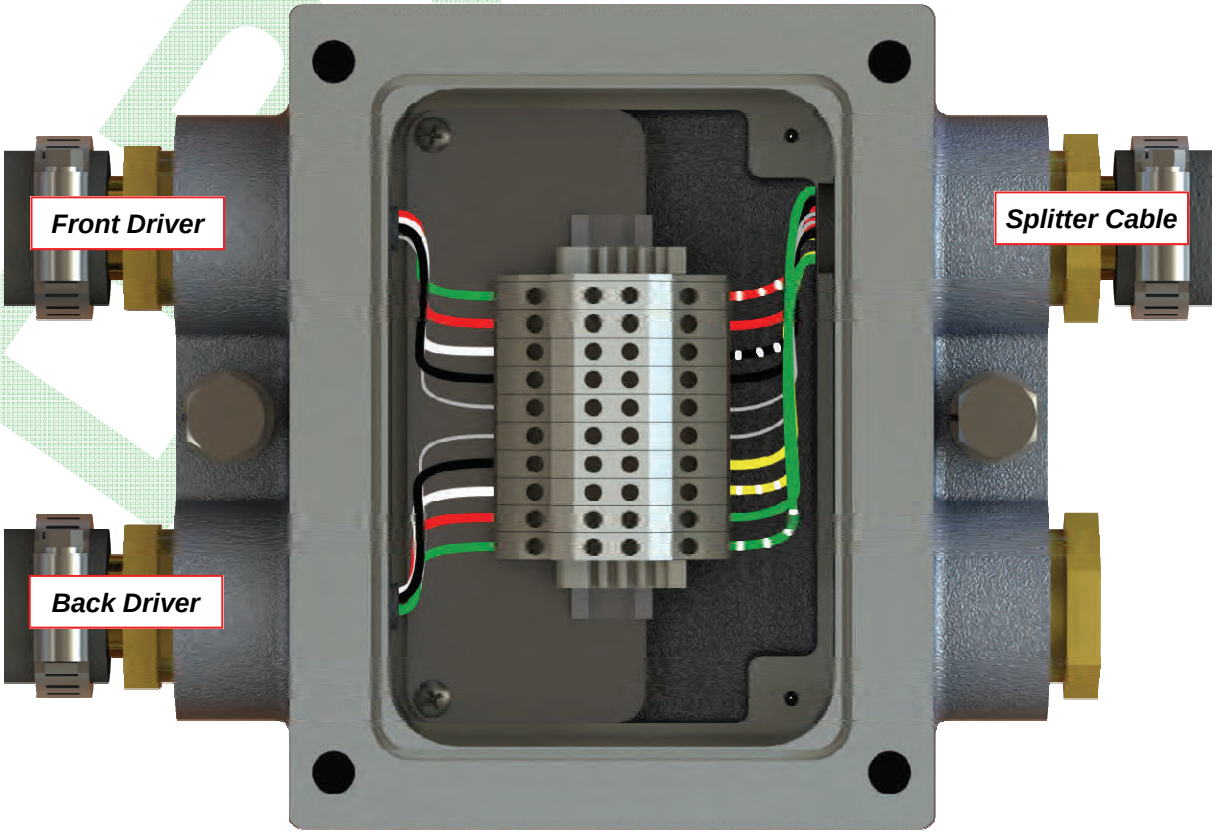
MX3-IZ Driver Installation

Driver Cable



1. Shield
2. White (Data +)
3. Green (Ground)
4. Red (+72VDC)
5. Black (Data -)



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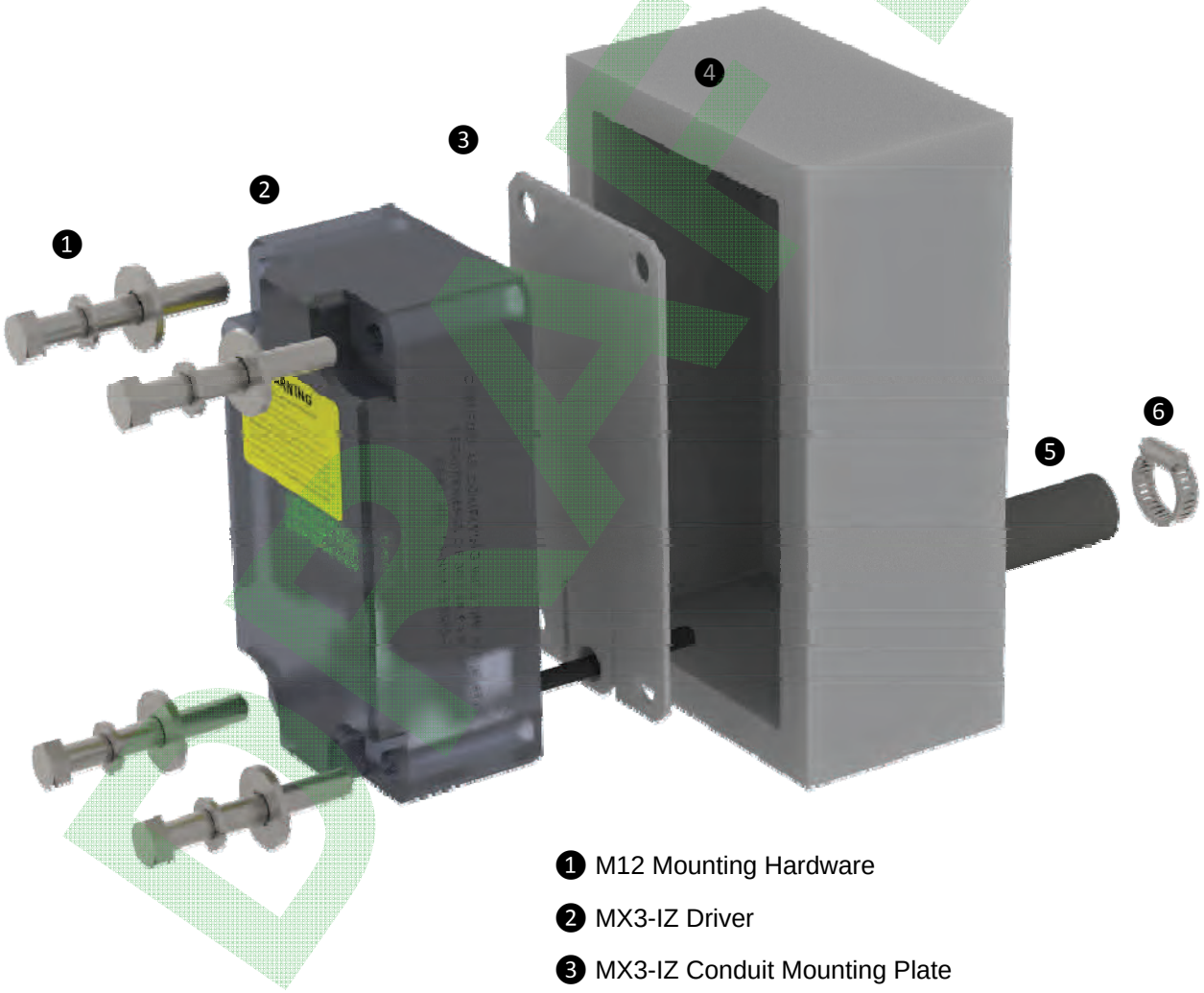
MX3-IZ Driver Standard Installation

The MX3-IZ Guarding that protects the Drivers is specifically designed for the new smaller MX3-IZ Drivers unlike previous Matrix Proximity Systems with larger guarding. The Driver cable must be inside conduit for its entire run and must be connected to either a MX3-IZ Conduit Mounting Plate or a conduit mounting nipple that is attached to the back or top of the guarding. The driver is mounted using M12 x 85mm Hex head bolts with washers and lock washers.



1. M12 Mounting Hardware
2. MX3-IZ Driver
3. MX3-IZ Conduit Mounting Plate
4. MX3-IZ Guard
5. 3/4” I.D. Rubber Hose Conduit
6. S.S. Worm Gear Hose Clamp

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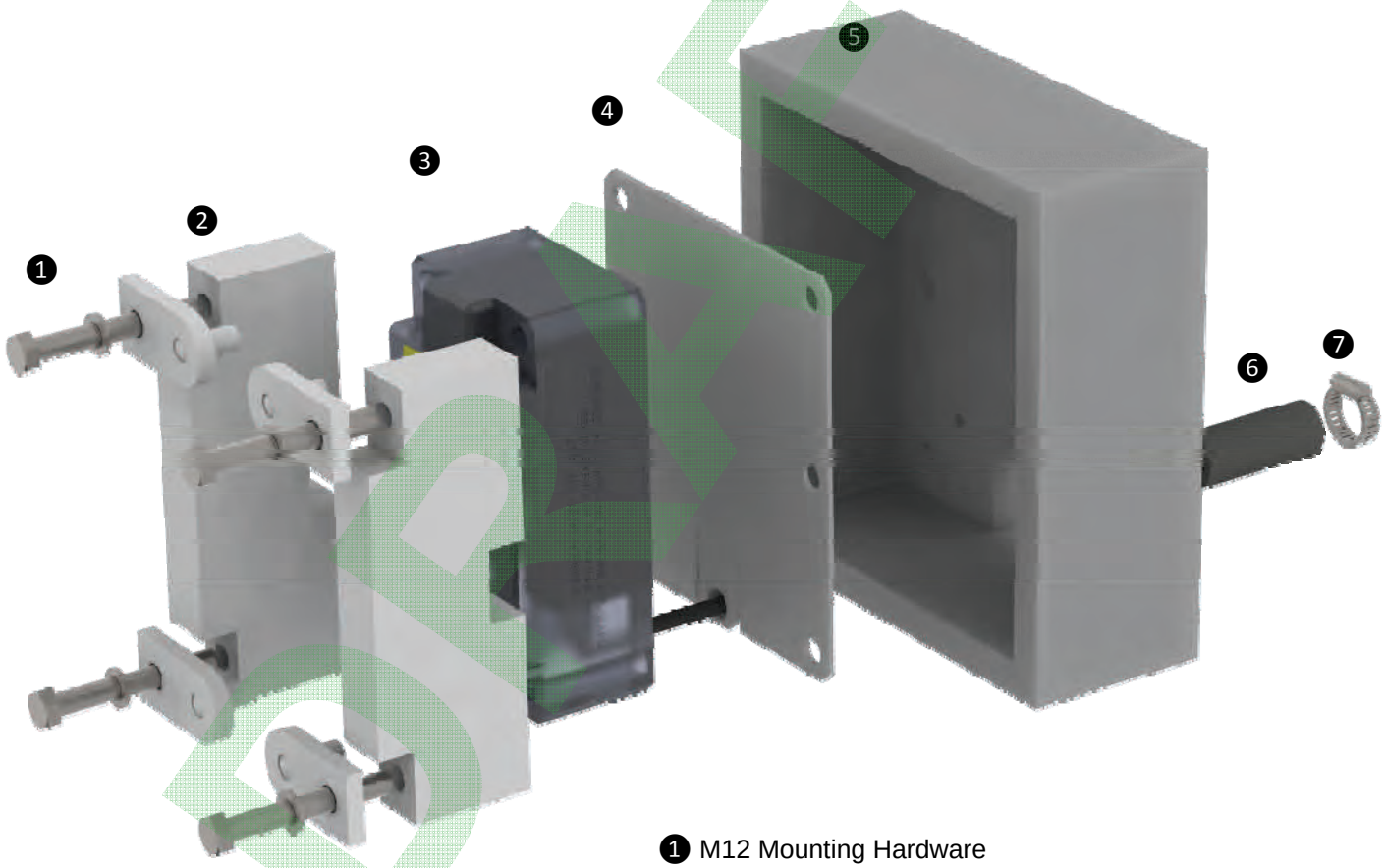
MX3-IZ Driver Retrofit Installation

The MX3-IZ Driver Adapter Kit is specifically designed for mounting the MX3-IZ Driver in the larger guarding that is standard on the older M3K-1000 Matrix Proximity System. The Driver cable must be inside conduit for its entire run and must be connected to either a MX3-IZ Conduit Mounting Plate or a conduit mounting nipple that is attached to the back or top of the guarding. The driver is mounted using M12 x 90mm Hex head bolts with lock washers.



1. M12 Mounting Hardware
2. MX3-IZ Driver Adapter Kit
3. MX3-IZ Driver
4. MX3-IZ Conduit Mounting Plate, Retrofit
5. M3-1000 Guard
6. 3/4” I.D. Rubber Hose Conduit
7. S.S. Worm Gear Hose Clamp

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MX3-IZ Controller

Overview

The Controller is the central processor for the IntelliZone™ System. It communicates to the mobile equipment and Locators and provides power to 4 machine-mounted Drivers. Personnel can connect to the Controller wirelessly (w/ adaptor) or with an Ethernet cable to adjust settings and view system diagnostics. This device IS NOT intrinsically safe and MUST be inside an explosion-proof enclosure when used in MSHA-regulated environments.

LED States

The Controller features (9) LEDs that can provide the operator with basic system diagnostics information. The LEDs are located on the top surface of the Controller, and can be in either a blinking or continuously lit (solid).

Blinking

Solid

FUNCTION	LED	RESPONSE
POWER		CONTROLLER HAS POWER
HEARTBEAT		CONTROLLER SOFTWARE IS ACTIVE
		INTERFACE & PROXIMITY ARE ACTIVE
I/O ACTIVITY		I/O ACTIVITY (SD CARD OR SENSORS)
RF		RF ACTIVITY
ETHERNET		WIRED NETWORK ACTIVITY
DRIVER 0-3		NORMAL OPERATION
		DRIVER DISABLED
		POWER FAILURE

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Available System Drawings

Drawing	Product	Category	Description
10000058	Driver	Installation Detail	Shows proper installation of Driver w/ and w/o adapter kit
10001901	Charger	Product Overview	Provides generic Locator Charger dimensions and specs
10001691	Charging Rack	Product Overview	Provides generic Locator Charging Rack dimensions and specs
10001659	Power Supply Box	Schematic	Wiring Schematic for system power supply box
10001978	Controller Box	Schematic	Wiring Schematic for system Controller box
10001638	Controller Box	Product Overview	Provides generic Controller XP Box dimensions and specs
10001685	Controller Box	Installation Detail	Shows proper installation of Controller XP Box w/ use of weld blocks
10001639	Power Supply Box	Product Overview	Provides generic Power Supply Box dimensions and specs
10001950	Antenna Kit	Installation Detail	Shows proper installation of the Whip Antenna Mounting Kit
10001950	Retrofit Antenna Kit	Installation Detail	Shows proper installation of the Retrofit Antenna Mounting Kit
10000152	Overall System	Product Overview	Provides a generic overview of the entire system
10001288	Overall System	Schematic	Provides a generic overall system wiring schematic
10001974	C2C System	Schematic	Provides an overall system wiring schematic for a JOY C2C machine
10001975	JNA System	Schematic	Provides an overall system wiring schematic for a JOY JNA machine
10001976	DC System	Schematic	Provides and overall system wiring schematic for a JOY DC machine
10001977	BH-18 System	Schematic	Provides an overall system wiring schematic for a JOY BH-18 machine
10000112	Shuttle Car System	Installation Detail	Provides a generic system layout on a Standard Shuttle Car
10000127	Shuttle Car System	Installation Detail	Provides a generic layout of Driver Guarding on a Standard Shuttle Car
10000132	14CM15 R. System	Installation Detail	Provides a generic retrofit system layout on a JOY 14CM15 machine
10001603	14CM15 System	Installation Detail	Provides a generic system layout on a JOY 14CM15 machine

††† Multiple Drawing Numbers are available for product under the listed category. Please request drawings by “Product” column name to receive a list of available drawings for the desired product.

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Fasteners

	Fastener	Quantity
MX3-IZ Driver		
	Hex Head M12-1.75x85	4
	Washer M12	4
	Washer Split Lock M12	4
MX3-IZ Driver Retrofit Kit		
	Hex Head M12-1.75x90	4
	Washer Split Lock M12	4
MX3-IZ Controller XP Box		
	Hex Head 1/2-13x1.25	10
	Washer Split 1/2	10
	Nut Hex Jam 3/8-16	4
MX3-IZ Power Supply XP Box		
	Hex Head 1/2-13x1.25	10
	Washer Split 1/2	10
	Nut Hex 1/4-20	4
MX3-IZ Machine Mount Blocks		
	Hex Head 1/2-13x1.0	1
	Washer Split 1/2	1

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Installation Requirements

- Drivers can be mounted upside down, but must be vertical
- Controller and Power Supply XP Enclosures must pass 0.004 feeler gauge inspection
- Splitter XP Enclosures must pass 0.002 feeler gauge inspection
- XP Gland Gap (Between Gland Plug and XP Box Steel Port) must measure between 1/8” MIN, 1/4” MAX
- Glands must be secured with a lead tie or set screw
- Open gland ports must be sealed using Steel Plug, and plug must be spot welded in place
- Components on a common frame must be solidly frame grounded
- The Intrinsically safe portion of the RF Barrier must be kept isolated from the non-Intrinsically safe wiring
- Ensure that RF antennas are isolated from machine ground
- Driver cables and 8-pair Matrix Cable must be installed with protective conduit and clamps
- Antenna cables (LMR195-fr) do not require conduit but are highly recommended for protection
- Though not required, ferrules or tinning the end of all wires inside the Controller XP Box and Splitter XP Box is recommended

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MX3-IZ Driver LED States

The Driver features an array of (27) LEDs that can provide the operator with basic system diagnostic information. The LEDs are visible from the front of the Driver, and assume either a blinking or solid state. Knowledge of Driver LED codes can help isolate system errors, should a problem arise. The error codes are communicated to personnel by means of LED color and duration.

DEFINITION	TIME DURATION (SECONDS)											
System operational; no Locator associated as operator	1.0			1.0					1.0			
System operational; Locator associated as operator	Continuous											
Warning Zone Breach	½		½		½		½		½		½	
Shutdown Zone Breach	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Proximity Protection System is bypassed	½		½		½		½		½		½	
System Error	Continuous											
MX3-IZ Locator Error	Continuous											
MX3-IZ Driver Error (Diagnostic Warning); single LED	Continuous											
MX3-IZ Driver Error (Diagnostic Error); single LED	Continuous											

MX3-IZ Locator LED States

The Locator features (3) LEDs that can provide the operator with basic system diagnostic information. The LEDs are visible from the front of the Locator, and assume either a blinking or solid state. Knowledge of Locator LED codes can help isolate system errors, should a problem arise. The error codes are communicated to personnel by means of LED color and duration.

DEFINITION	TIME DURATION (SECONDS)											
System Operation Normal	1.0			1.0					1.0			
Warning Zone Breach	½		½		½		½		½		½	
Shutdown Zone Breach	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
System, Locator, or Driver Error	Continuous											

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MX3-IZ Audible Alarm

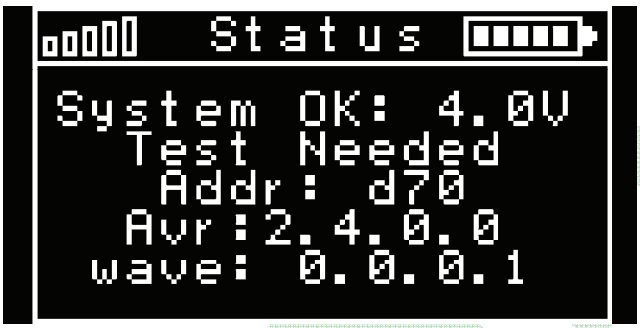
The Locator also features an audible alarm that can alert users and/or nearby personnel of a zone breach.

DEFINITION	TIME DURATION (SECONDS)											
Warning Zone Breach	½		½		½		½		½		½	
Red Zone Breach	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼

OLED Screen

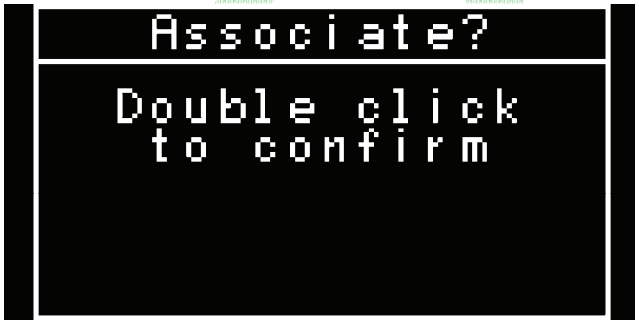
The user-interface screen on the front of the Locator provides personnel with important system diagnostics information. It allows users to initiate key features of the IntelliZone™ System. It is important to understand the information provided and how to properly interact with the Locator. User input is provided through the push-button found atop the Locator and prompts on the OLED screen.

STATUS SCREEN (PRESS + HOLD)



1. Signal Strength and Battery Level
2. System Status and Locator Operating Voltage
3. When displayed, test using MX3-IZ Locator Tester
4. Locator Identification
5. Development Information
6. Development Information

ASSOCIATE / DISSOCIATE (DOUBLE CLICK)



This allows users to associate / dissociate themselves as an operator of a particular piece of machinery. **In order to do so, there must first be an Initiation Zone configured using the IntelliZone™ System GUI (Graphical User Interface).** Standing inside this zone, the user may associate or dissociate as operator by double-clicking the Locator's push-button. Double-click again to confirm association / dissociation. There will be (2) quick audible signals confirming that the process was successful.

If user requests association / dissociation but fails to confirm within (10) seconds, the Locator will timeout and default to normal operation.

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Troubleshooting

These issues have been observed by Matrix Technicians.

Inspections

- Locators should be inspected for physical damage before every shift. Locators should also be tested above ground before every shift.
- Drivers should be inspected for physical damage before every shift.

Operator Dissociating Issues

- RF is CRITICAL to the operation of the system. If the zones are not consistent or the Locator is not tracking well check RF cables and antenna.
- If the operator moves too far from the machine, he will have to re-associate to use the piece of equipment. The operator will see the green LEDs flashing on the Drivers when he is NOT the operator.
- If the operator is having to re-associate often, there is likely an issue with the RF antenna or cabling.

Power Supply

- If the system is not powering up, check 72VDC and 24VDC power in the interface board.
- If no voltage found on the interface board, check 3A glass fuses in the Power Supply XP box.

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System Diagnostic Codes

The IntelliZone™ Proximity Detection System features machine status codes to assist the user in determining the source of an issue should one arise during operation. These codes result from diagnostic tests that are continuously executed by the Controller, and can be viewed in the IntelliView Diagnostic Data Inspection window or on an associated Locator's OLED screen. Press and hold the Locator's Push-button to display a 7-digit machine status code.

PART	ERROR CODE	CORRECTIVE ACTION
Driver	3.02.0000, 4.02.0000	Reboot, Replace Driver
Driver	3.02.0001, 4.02.0001	Check Driver data wires, Replace Driver
Driver	3.02.0002, 4.02.0002	Check Driver power wires, Replace Driver
Driver	3.02.0003, 4.02.0003	Check Interface board, Replace Interfaceboard, Replace Driver
Driver	3.02.0004, 4.02.0004	Contact Matrix
Driver	3.02.0005, 4.02.0005	Check 72V power supply and fuses
Driver	3.02.0006, 4.02.0006	Reboot, Replace Driver
RF Module	3.03.0000, 4.03.0000	Replace Controller
RF Module	3.03.0002, 4.03.0002	Too many locators or controllers in area
RF Module	3.03.0003	Will display when Analog inputs are not in use
Prox Sensor	3.05.0000, 4.05.0000	Too many controllers in area
Controller	3.10.0000, 4.10.0000	Call Matrix
Controller	3.10.0001, 4.10.0001	Call Martix, Replace controller
Controller	3.10.0002	Order new Software Key
Controller	4.10.0002	Replace Software Key

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Operating Guidelines

System Warning

It is important that all users / personnel who may come into contact with the IntelliZone™ Proximity Detection System understand it's purpose. It is NOT a safety system. It is a training aid developed to teach users safe operating habits. User / Operator assumes full responsibility for control of the machine upon which the system is installed. User / Operator assumes full liability for the maintenance and operation of the IntelliZone™ Proximity Detection System. Based upon this understanding, the following precautions must be taken.

Precautions

- Do not use the *IntelliZone™ system* without proper training and documentation
- The Locator must be worn at all times
- Position the Locator between shoulder and waist height on the front side of the body for proper operation
- Do not position the Locator near metal tools, cap lamp battery, or other metal items while operating the system
- When operating the machinery on a grade use extra caution as the machine may coast further than normal

System Overview

The Matrix IntelliZone™ Proximity Detection System assists with training personnel to stay clear of dangerous zones present around potentially hazardous equipment. The System is designed for use on mobile equipment such as continuous miners, mobile haulage, and other light and heavy vehicles. The System is typically configured for two operational awareness zones: a "shutdown zone" (red) can be defined closest to the equipment and a "warning zone" (yellow) can be defined to extend a moderate distance from the equipment. When an IntelliZone™ Locator is detected within the red zone, the System will prompt the equipment to immediately shutdown some or all of its functions. When an IntelliZone™ Locator is detected within the yellow zone, the System will prompt the equipment to reduce its speed or influence other changes in operation. If a Locator is detected within either zone, the System will initiate highly-visible flashing lights and an audible alarm on the Locator and Drivers to warn personnel of potential hazards.

Additional IntelliZone™ awareness zones can be configured as needed and are customizable to specific equipment and applications.

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MX3-IZ Driver

Overview

The MSHA-approved Driver allows for tracking of multiple Locators. The Driver is machined from rugged polycarbonate and incorporates multi-color LEDs used for diagnostics and zone identifications.

WARNING

- DO NOT USE THE PROXIMITY DETECTION SYSTEM WITHOUT PROPER TRAINING.
- IMPROPER ADJUSTMENT MAY RESULT IN FAILURE OF THE SYSTEM TO OPERATE OR OPERATE CORRECTLY.
- DISCLAIMER: USER/OPERATOR UNDERSTANDS THAT THE PROXIMITY DETECTION SYSTEM IS NOT A SAFETY SYSTEM. IT IS A TRAINING AID TO TEACH SAFE OPERATING HABITS. OPERATOR IS RESPONSIBLE FOR CONTROL OF THIS MACHINE.
- USER/OPERATOR ASSUMES LIABILITY FOR THE MAINTENANCE AND OPERATION OF THE PROXIMITY DETECTION SYSTEM.

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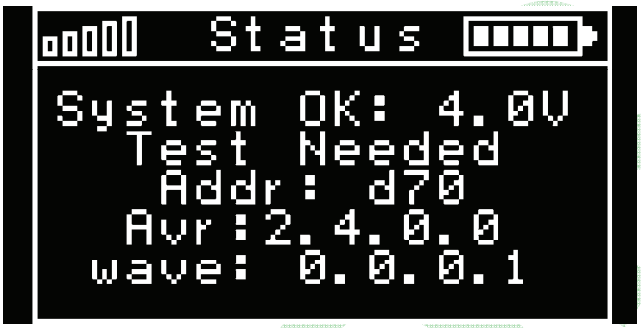
MX3-IZ Locator

Overview

The MX3-IZ Locator should be worn by the operator at all times. The device has audible and visible alarms to alert the operator of zone breaches. The device has LEDs the also indicate zone breaches and errors on the system. An OLED screen displays the Locator status and is used in conjunction with the multifunction button to associate or dissociate with the machine.

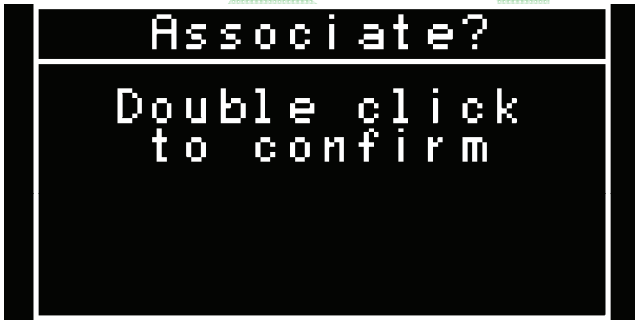
OLED Screen

STATUS SCREEN (PRESS + HOLD)



1. Signal Strength and Battery Level
2. System Status and Locator Operating Voltage
3. When displayed, test using MX3-IZ Locator Tester
4. Locator Identification
5. Development Information
6. Development Information

ASSOCIATE / DISSOCIATE (DOUBLE CLICK)



This allows users to associate / dissociate themselves as an operator of a particular piece of machinery. **In order to do so, there must first be an Initiation Zone configured using the IntelliZone™ System GUI (Graphical User Interface).** Standing inside this zone, the user may associate or dissociate as operator by double-clicking the Locator's push-button. Double-click again to confirm association / dissociation. There will be (2) quick audible signals confirming that the process was successful.

If user requests association / dissociation but fails to confirm within (10) seconds, the Locator will timeout and default to normal operation.

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MX3-IZ Driver LED States

Under normal operation the user should see these LEDs on the Drivers.

DEFINITION	TIME DURATION (SECONDS)											
System operational; no Locator associated as operator	1.0				1.0				1.0			
System operational; Locator associated as operator	Continuous											
Warning Zone Breach	½		½		½		½		½		½	
Shutdown Zone Breach	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Proximity Protection System is bypassed	½		½		½		½		½		½	

If there is an error on the system, the Drivers will display these LEDs.

DEFINITION	TIME DURATION (SECONDS)					
Proximity Protection System is bypassed	½	½	½	½	½	½
System Error	Continuous					
MX3-IZ Locator Error	Continuous					
MX3-IZ Driver Error (Diagnostic Warning); single LED	Continuous					
MX3-IZ Driver Error (Diagnostic Error); single LED	Continuous					

MX3-IZ Locator LED States

Under normal operation the user should see these LEDs on the Locator.

DEFINITION	TIME DURATION (SECONDS)											
System Operation Normal	1.0				1.0				1.0			
Warning Zone Breach	½		½		½		½		½		½	
Shutdown Zone Breach	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼

If there is an error on the system, the Locator will display this LED.

DEFINITION	TIME DURATION (SECONDS)
System, Locator, or Driver Error	Continuous

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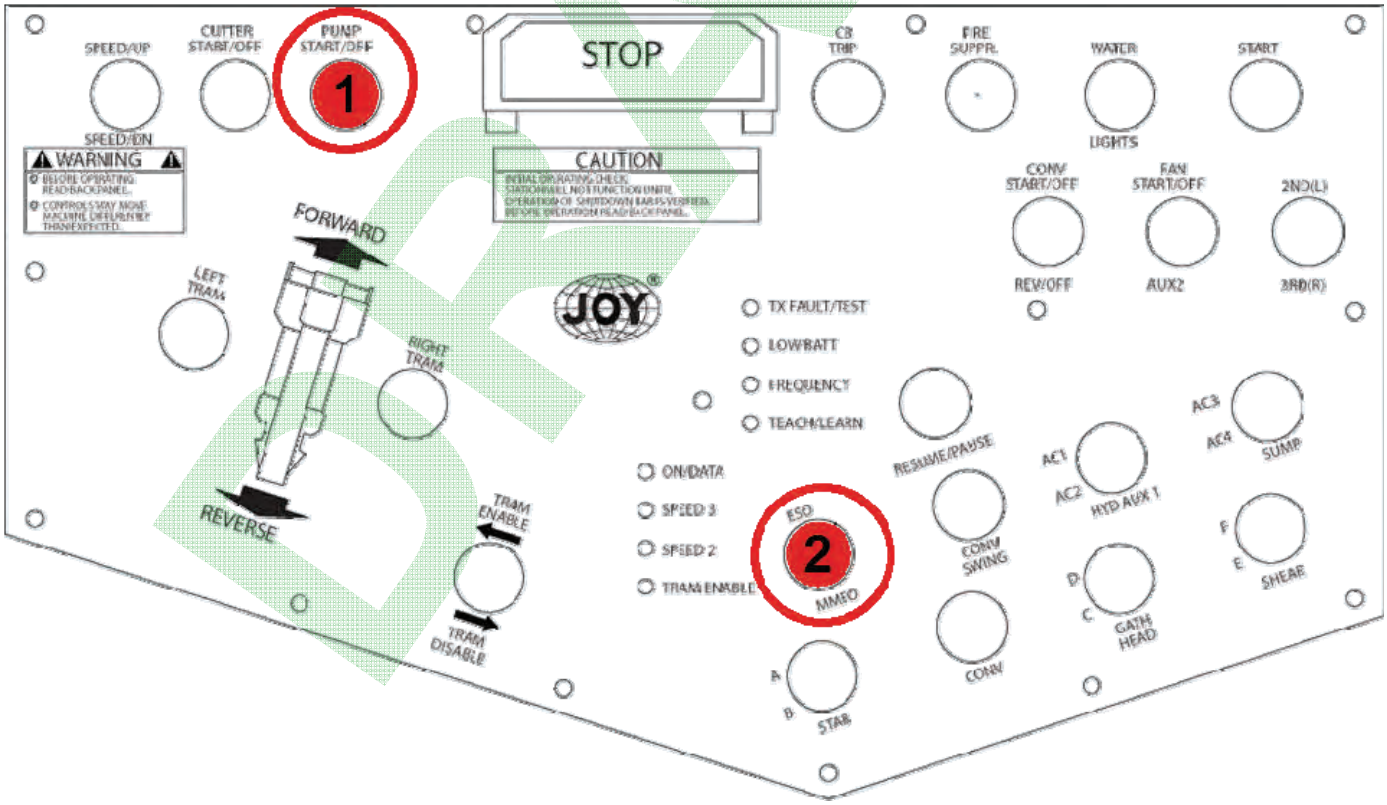
Emergency Stop Override

The IntelliZone™ Proximity Detection System features an ESO (Emergency Stop Override). This function is only to be used in Emergency situations where the Proximity System must be bypassed. For Continuous Miners this feature is activated with the machine's remote control. This mode has limited functionality in that it will only allow low speed tram. It is important that all miner operators and/or other personnel that come into contact with the system daily know how this process works in the event of an emergency.

JOY C2C & DC Continuous Miner

1. Toggle and hold the ESO/MMO switch 2 in the **ESO** position.
2. Toggle and hold the Pump switch 1.
3. Release the pump switch 1, but continue to hold the ESO/MMO switch 2 in the **ESO** position.
4. Activate the tram functions and move the machine to safe location.
5. Release the ESO switch to resume normal machine operation.



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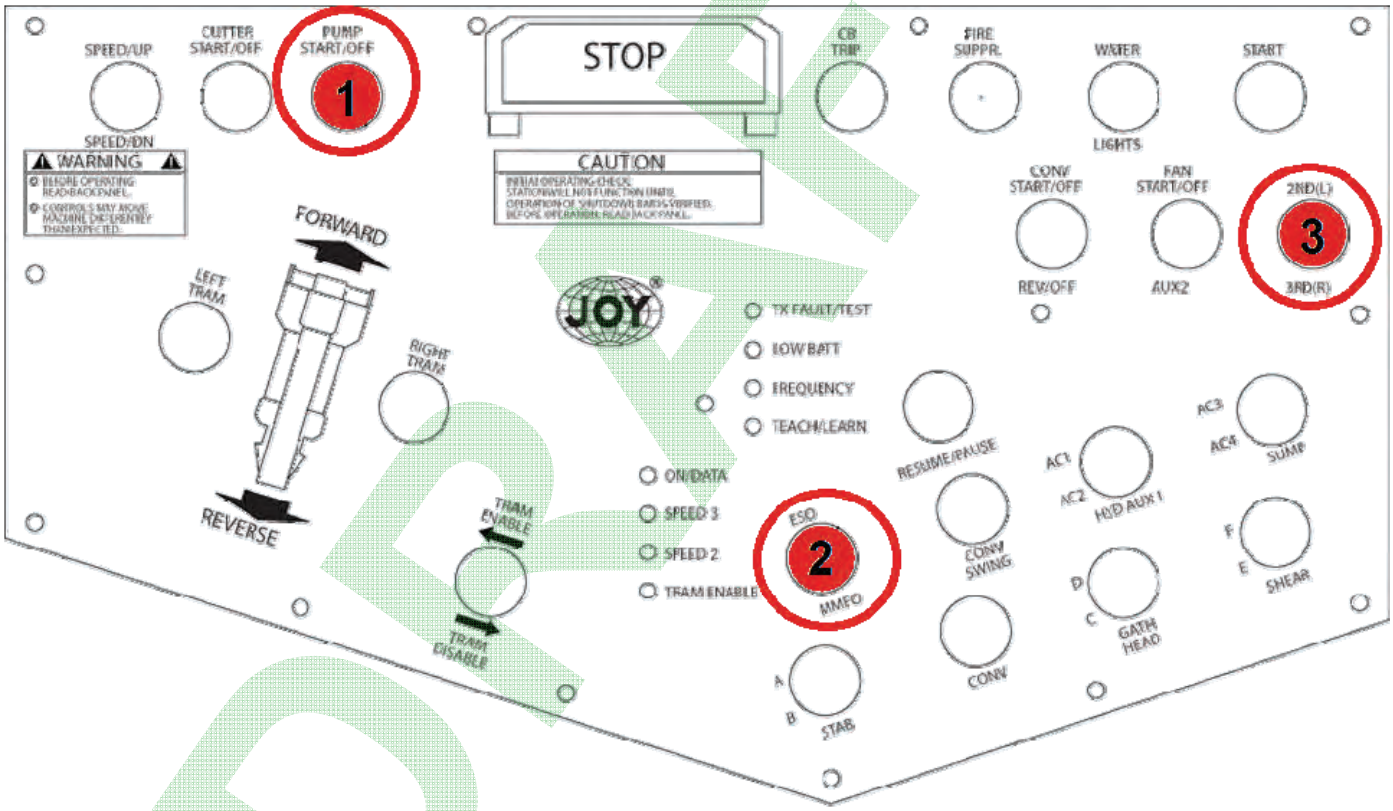
JOY JNA Continuous Miner

1. Toggle and hold the ESO/MMO switch 2 in the position.
2. Toggle and hold the Pump switch 1 and 2ND/3RD switch 3 in the **UP** position.
3. Release the pump switch 1 and 2ND switch 3, but continue to hold the ESO/MMO switch 2 in the **ESO** position.
4. Activate the tram functions and move the machine to safe location.
5. Release the ESO switch to resume normal machine operation.



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FCC Compliance

US FCC Compliance Statements:

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received,

including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This portable transmitter with its antenna complies with FCC/IC RF exposure limits for general population / uncontrolled exposure.

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Canada IC Compliance / Canada États IC conformité

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

En vertu des règlements d'Industrie Canada, cet émetteur de radio ne peut fonctionner à l'aide d'une antenne d'un type et le gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Pour réduire le risque d'interférence aux autres utilisateurs, le type d'antenne et son gain doivent être choisis afin que la puissance isotrope équivalente (e.i.r.p) rayonnée ne dépasse pas ce qui est nécessaire pour une communication réussie.

This Device complies with Industry Canada License-exempt RSS standard(s). Operation is subject to the following two conditions: 1) this device may not cause interference, and 2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme avec Industrie Canada RSS exemptes de licence standard (s). Son fonctionnement est soumis aux deux conditions suivantes:

1) ce dispositif ne doit pas causer d'interférences, et

2) ce dispositif doit accepter toute interférence, y compris celles pouvant causer un mauvais fonctionnement de l'appareil.

MX3-IZ Locator IDs

FCC ID:USK-10000615

IC ID:11898A-1000615

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