



Yale® YK/Shaw-Box® SK Crane Kit Intelli-Protect™ Technical Manual



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FAMILY OF BRANDS



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PREFACE AND SAFETY

Product Safety Information

Magnetek offers a broad range of radio remote control products, control products and adjustable frequency drives, industrial braking systems, and power delivery products for material handling applications. This manual has been prepared by Magnetek to provide information and recommendations for the installation, use, operation and service of Magnetek's material handling products and systems (Magnetek Products). Anyone who uses, operates, maintains, services, installs or owns Magnetek products should know, understand and follow the instructions and safety recommendations in this manual for Magnetek products.

The recommendations in this manual do not take precedence over any of the following requirements relating to cranes, hoists, lifting devices or other equipment which uses or includes Magnetek products:

- Instructions, manuals, and safety warnings of the manufacturers of the equipment where the Magnetek Products are used,
- Plant safety rules and procedures of the employers and the owners of the facilities where the Magnetek Products are being used,
- Regulations issued by the Occupational Health and Safety Administration (OSHA),
- Applicable local, state, provincial, or federal codes, ordinances, standards and requirements, or
- Safety standards and practices for the industries in which Magnetek Products are used.

This manual does not include or address the specific instructions and safety warnings of these manufacturers or any of the other requirements listed above. It is the responsibility of the owners, users and operators of the Magnetek Products to know, understand and follow all these requirements. It is the responsibility of the employer to make its employees aware of all the above listed requirements and to make certain that all operators are properly trained. **No one should use Magnetek Products prior to becoming familiar with and being trained in these requirements and the instructions and safety recommendations for this manual.**

Product Warranty Information

For information on Magnetek's product warranties by product type, please visit the Material Handling site at www.magnetekmh.com.

DANGER, WARNING, CAUTION and NOTE Statements

Read and understand this manual before installing, operating, or servicing this product.

The following conventions indicate safety messages in this manual. Failure to heed these messages could cause fatal injury or damage products and related equipment and systems.

DANGERS, WARNINGS and CAUTIONS

Throughout this document DANGER, WARNING and CAUTION statements have been deliberately placed to highlight items critical to the protection of personnel and equipment.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.



- Read this user manual in its entirety before installing Intelli-Protect software.
- DO NOT connect or disconnect wiring or perform signal checks while the electrical power is ON.
- Improper programming with this software can lead to unexpected, undesirable, or unsafe operation.

Failure to observe these and other precautions indicated in this manual will expose the user to high voltages, resulting in serious injury or death. Damage to equipment may also occur.



CAUTION

No patent liability is assumed with respect to the use of the information contained herein. Moreover, Magnetek is constantly improving its high-quality product; therefore, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this document. Nevertheless, Magnetek assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

NOTE: A *NOTE* statement is used to notify people of installation, operation, programming or maintenance information that is important, but not hazard-related.

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1 Introduction

Protect personnel and improve facility throughput with Intelli-Protect No-Fly Zone systems, part of the Intelli-Crane™ portfolio of products. No-Fly Zones (NFZs) refer to protected areas where normal crane operation is limited or entirely restricted. Magnetek-brand Intelli-Protect Systems allow you to designate locations where a crane is programmed to slow down or stop, using motion control products such as variable-frequency drives, radio remote controls, and sensors.

These versatile systems – ranging from simple to complex configurations – can be added to existing crane controls or introduced as new installations for a variety of industries, including automotive, steel, manufacturing, and pulp and paper.

1.1 Intelli-Protect Model Numbers

Monorail Hoist		
Intelli-Protect Configurable Location Description	Hoist Frames A, B, C	Hoist Frames D, E
Configurable Intelli-Protect (50 x 50 m)	NFZ-FC-5050 M1	NFZ-FC-5050 M2
Configurable Intelli-Protect (50 x 150 m)	NFZ-FC-50150 M1	NFZ-FC-50150 M2
Configurable Intelli-Protect (50 x 300 m)	NFZ-FC-50300 M1	NFZ-FC-50300 M2
Top Running Hoist		
Intelli-Protect Configurable	Hoist Frames A, B, C, D	Hoist Frames E
Configurable Intelli-Protect (50 x 50 m)	NFZ-FC-5050 TR1	NFZ-FC-5050 TR2
Configurable Intelli-Protect (50 x 150 m)	NFZ-FC-50150 TR1	NFZ-FC-50150 TR2
Configurable Intelli-Protect (50 x 300 m)	NFZ-FC-50300 TR1	NFZ-FC-50300 TR2

1.1.1 Intelli-Protect™ Configurable No-Fly Zones

Configurable No-Fly Zone systems utilize laser positioning sensors installed on bridge/trolley motions that interface with controllers for functional customization. This system incorporates a simplified menu-driven operator interface accessed over wireless connection via the use of a Personal Electronic Device (PED) such as a laptop, smartphone, or tablet.

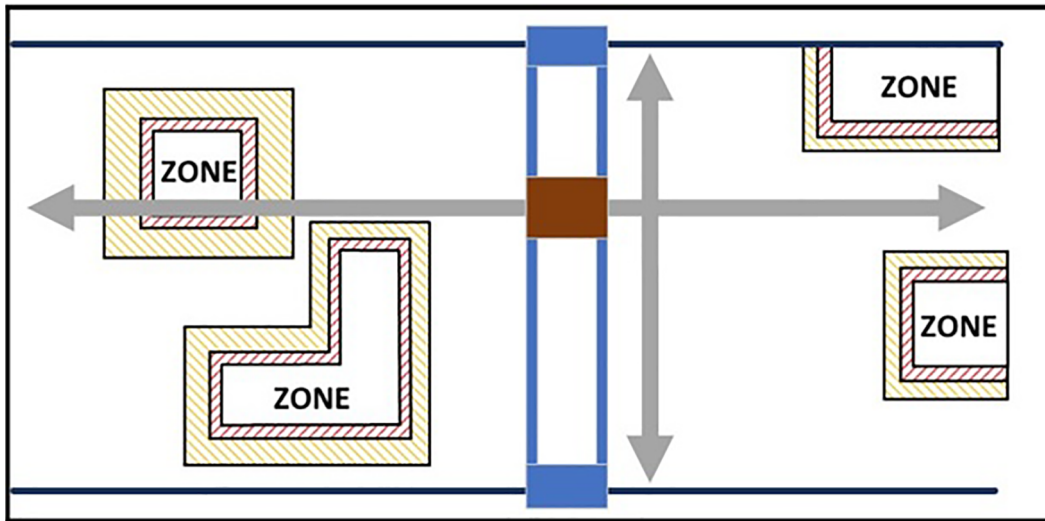


Figure 1-1: Configurable NFZ Example Configurations (Overhead Traveling Bridge Crane)

- Enable and configure up to 31 No-Fly Zones with a configurable system
- Quickly define NFZ boundaries using two diagonal corner positions while positioning hoist or enter location manually
- Determine position using lasers for 50, 150, and 300 meter spans and runways
- Define bridge and trolley slow, stop, and protected boundaries using laser positioning
- Using a PED (smartphone, tablet), open a **Zone Overview** screen on Configurable systems:
 - See enabled NFZ boundaries on runway floor plan
 - See active zone states (Enable, disable or change zones as floor plan changes)
- Light stack with horn for visual and audible notifications
- Hoist upper travel limit switch provides the option to fly over your No-Fly Zones when horn/zone override input is triggered
- External key switch to disable protection zones and Wi-Fi

1.2 Intelli-Protect™ Parts

NFZ-FC-5050		
Intelli-Protect	Spec	Qty
Intelli-Protect Control Panel	Includes PLC, Wi-Fi, quick connect plug	1
Light Stack with Horn	Field mounted, includes cable	1
Bridge Motion Laser	50 m laser, cables, and mounting bracketry	1
Bridge Reflector	Field mounted, reflector 24 x 24 in., DIN rail mounting	1
Trolley Motion Laser	50 m laser, cables, and girder mounting bracketry	1
Trolley Motion Reflector	Reflector 24 x 24 in., hoist mounting bracketry	1

NFZ-FC-50150		
Intelli-Protect	Spec	Qty
Intelli-Protect Control Panel	Includes PLC, Wi-Fi, quick connect plug	1
Light Stack with Horn	Field mounted, includes cable	1
Bridge Motion Laser	150 m laser, cables, and mounting bracketry	1
Bridge Reflector	Field mounted, reflector 24 x 24 in., DIN rail mounting	2
Trolley Motion Laser	50 m laser, cables, and girder mounting bracketry	1
Trolley Motion Reflector	Reflector 24 x 24 in., hoist mounting bracketry	1

NFZ-FC-50300		
Intelli-Protect	Spec	Qty
Intelli-Protect Control Panel	Includes PLC, Wi-Fi, quick connect plug	1
Light Stack with Horn	Field mounted, includes cable	1
Bridge Motion Laser	150 m laser, cables, and mounting bracketry	1
Bridge Reflector	Field mounted, reflector 24 x 24 in., DIN rail mounting	6
Trolley Motion Laser	50 m laser, cables, and girder mounting bracketry	1
Trolley Motion Reflector	Reflector 24 x 24 in., hoist mounting bracketry	1

1.3 Flexible Configurations with User Interface (UI)

Through our web-based UI, a user can perform the following standard operations using an iPhone, iPad, Android mobile or host computer over Wi-Fi:

- Configure your factory's Bridge and Trolley span limits
- View **Alarm List** showing active encroachments of user-defined slowdown and stop boundaries
- Configure optional hoist travel limit or machine lowered for No-Fly Zones

1.4 Light Stack

Three-Segment light stack with horn

Light Indicators		Intelli-Protect
Color	Industry Standard	No-Fly Zone
Green	Safe/Normal	Power on, PLC running - Solid
Amber	Warning/Abnormal	Flash - NFZ Slowdown Solid - NFZ Stop
Red	Danger/Fault	Fault - Solid
		Bypass - Flashing with horn sound No Zones Configured – Flashing with no horn

NOTE: If the panel bypass key switch is switched to disable the No-Fly Zone protection, the red light will flash continuously until protection has been re-enabled by the bypass key switch. A horn will turn on and off for a 30-second period and shut off.

2 Mechanical Installation

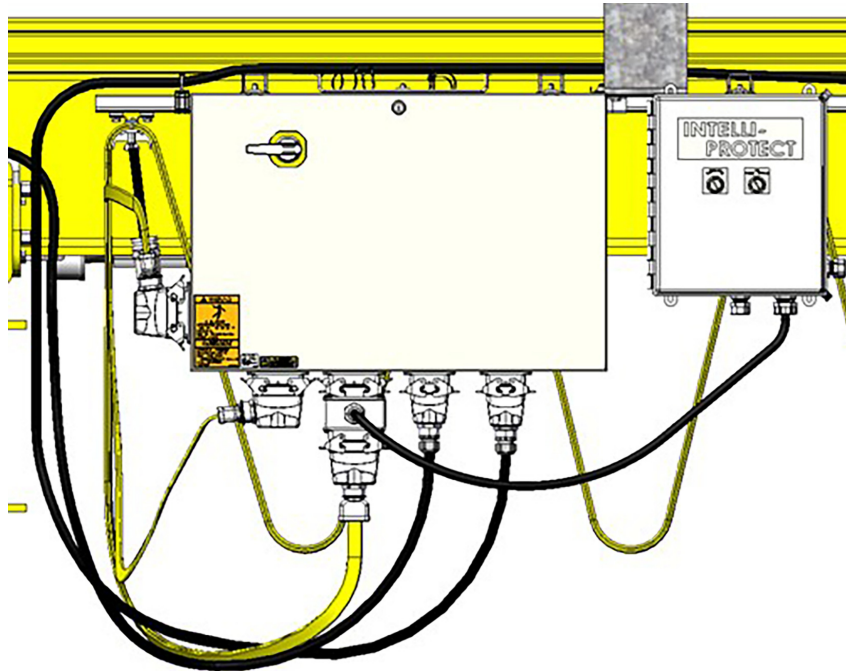


Figure 2-1: Intelli-Protect Control Panel Mounting

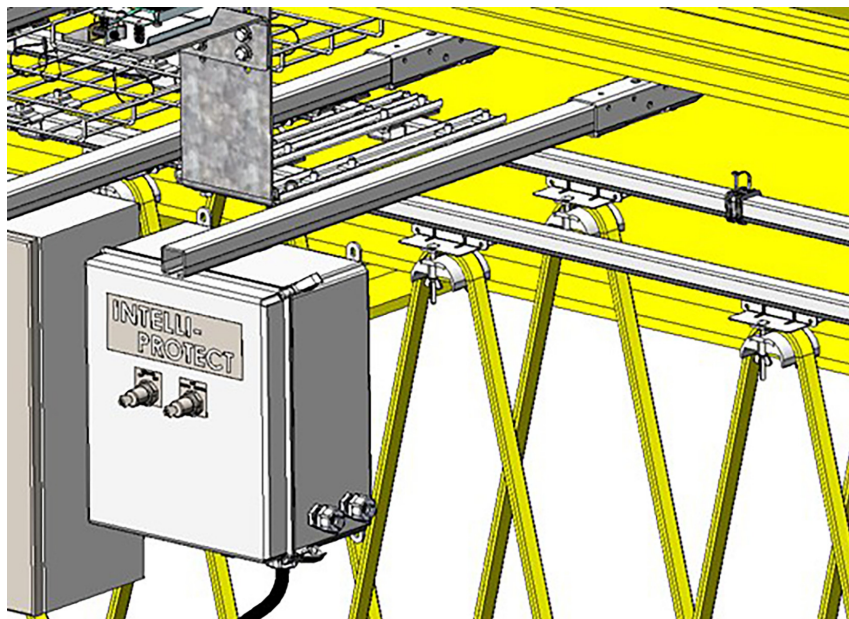


Figure 2-2: Cross Arm Support Mounting

- External panel-mounted key switch to disable protection zones and allow movement into all zones
- Padlock provision is included
- External mounted key switch to disable Wi-Fi connection after configuration

2.1 Environmental Ratings and Certifications

Specification	Panel
Operating Temperature	14°F to 122°F (-10°C to 50°C) max.
Vibration	3.5 mm / 3 gn at 8.4 to 150 Hz
Humidity	95% without condensation
Environmental Classification	NEMA 4X / IP 65
Certification	UL508A Industrial Control Panel

Suitable for outdoor use. For direct sunlight or extreme temperatures, contact Columbus McKinnon.

2.2 Laser Specification

Intelli-Protect 50 x 50 m Laser Specifications

Specification	Laser
Operating Temperature	-22°F to 131°F (-30°C to 55°C)
Operating Range	8 in. to 150 ft
Accuracy	1 in.
Laser Class	1
Wavelength	660 Nm
Ambient Light Limit	50000 Lux
Weight	0.2 lb

Intelli-Protect 150 and 300 m Laser Specifications

Specification	Laser
Ambient Temperature	14°F to 122°F (-10°C to 50°C)
Operating Range	0.3 to 150 m/300 m
Resolution	0.1 mm, adjustable
Laser Class	Measurement laser: 1 Alignment laser: 2
Wavelength	Measurement laser: 905 Nm Alignment laser: 660 Nm
Ambient Light Limit	>100000 Lux
Weight	1.5 lb

Beam Diameter at Each Distance

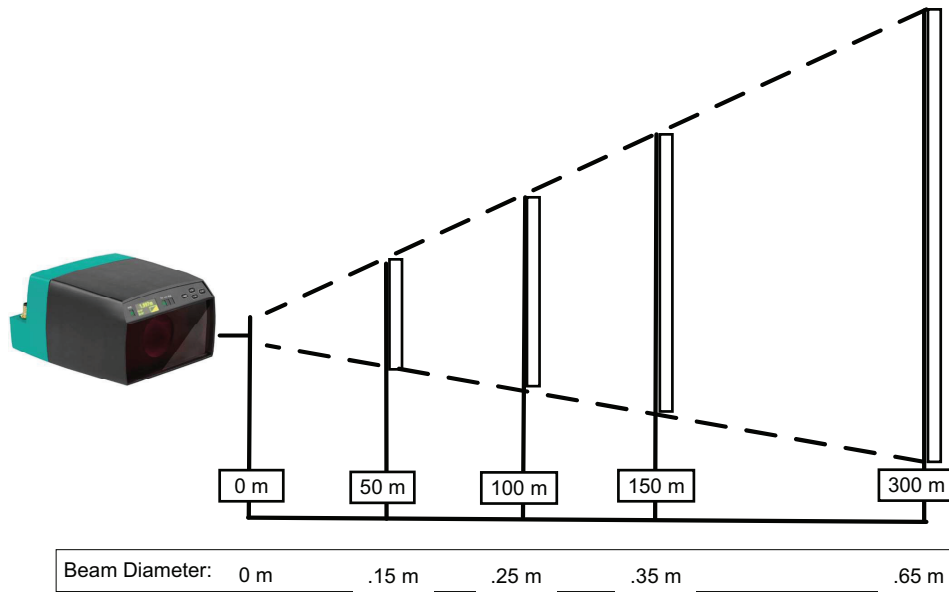


Figure 2-3: Beam Diameter at Each Distance (Side View of Laser)

2.3 Reflector Installation

For best reflectivity/laser signal, mount the reflector in the same orientation as the laser so the laser beam is perpendicular to the reflector. The arrow on the back of the reflector should be the same direction as the laser. **See Figure 2-4** below.

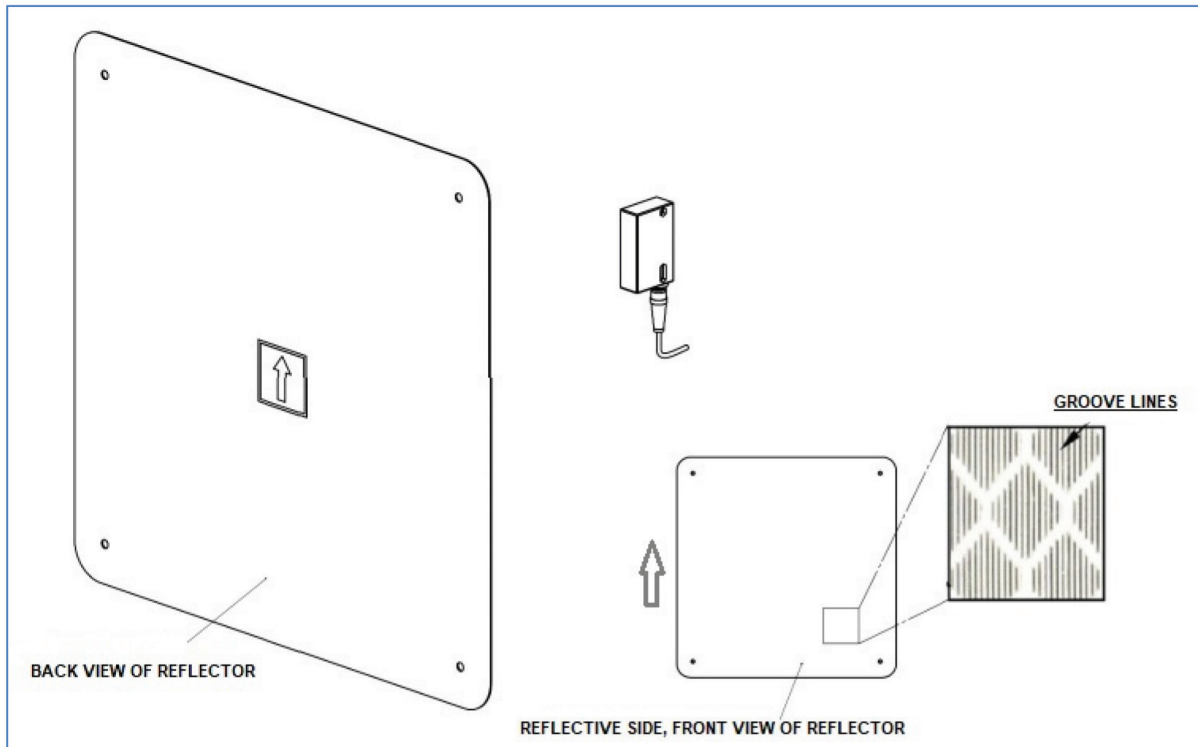
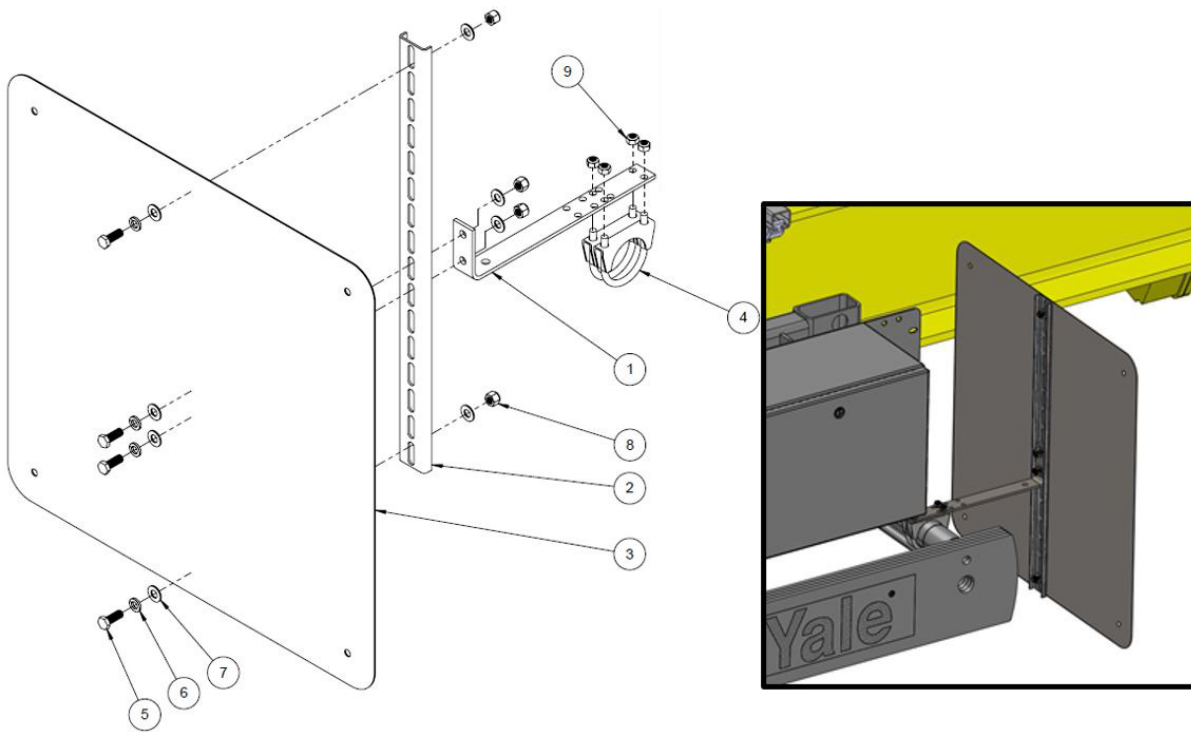


Figure 2-4: Mounting the Laser

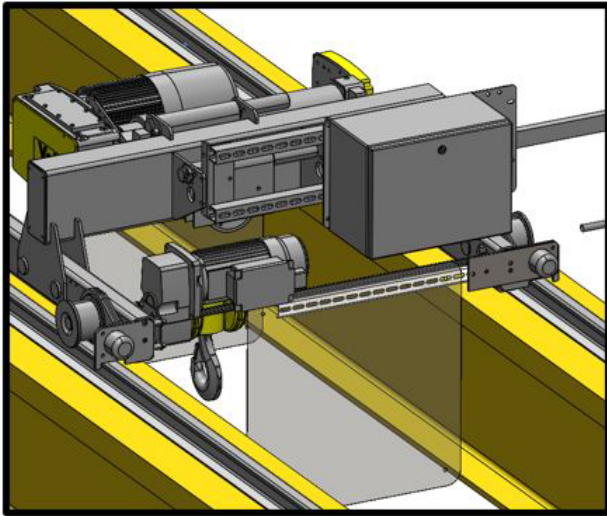
Reflector	Mounting Guide Reflector Layout	Qty
NFZ-FC-5050		
Trolley Reflector	1 wide x 1 high	1
Bridge Reflector	1 wide x 1 high	1
NFZ-FC-50150		
Trolley Reflector	1 wide x 1 high	1
Bridge Reflector	2 wide x 1 high	2
NFZ-FC-50300		
Trolley Reflector	1 wide x 1 high	1
Bridge Reflector	3 wide x 2 high	6

2.3.1 Trolley Reflector

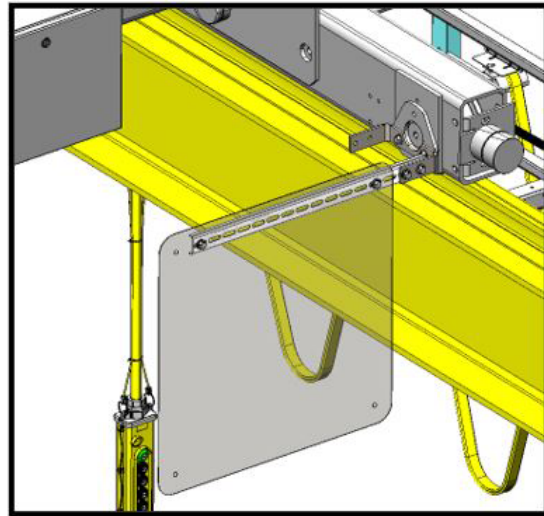


Item No.	Description	Qty
1	Bracket, Reflector, Monorail, Trolley Motion	1
2	BKS-F24-G Flange Mount BR	1
3	Reflector DIN-Mount, 24 x 24	1
4	Clamp, U-Bolt, M8, Dia. 48 mm, Frame A Clamp, U-Bolt, M8, Dia. 58 mm, Frame B Clamp, U-Bolt, M8, Dia. 75 mm, Frame C	2
5	Hex Cap Screw, Shallow Head, 3/8-16 x 1	4
6	Lock Washer, 3/8	4
7	Washer, 3/8 SAE	8
8	Nut, Nylon, 3/8	4
9	Nut, Nylon, M8	4

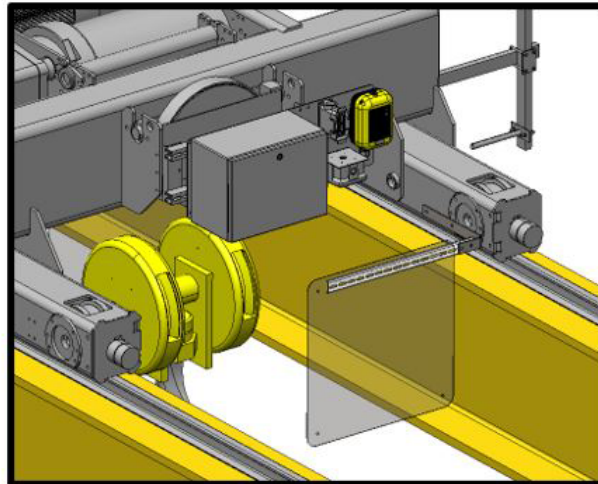
Figure 2-5: Monorail Version



Frames A and B



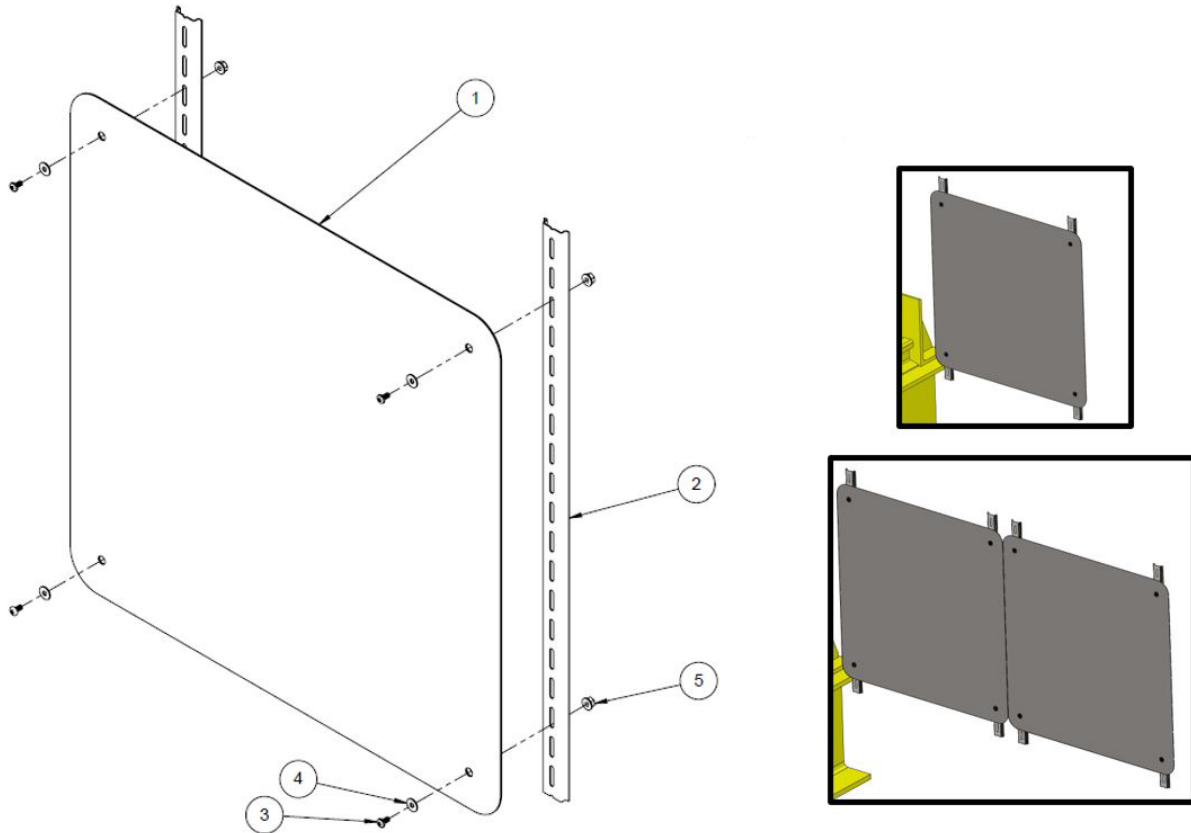
Frames C and D



Frame E

Figure 2-6: Top Running Version

2.3.2 Bridge Reflector



Item No.	Description	Qty
1	Reflector DIN-Mount, 24 x 24	1
2	DIN Rail, LaserGuard Reflector	2
3	PHMS, #10-32 x 3/8	4
4	Washer, .25 ID x .562 OD	4
5	Nut, #10-32, ESNA, Zinc	4

Figure 2-7: DIN Rail Mounting Arrangement

2.4 50 m Laser Installation and Wiring



CAUTION

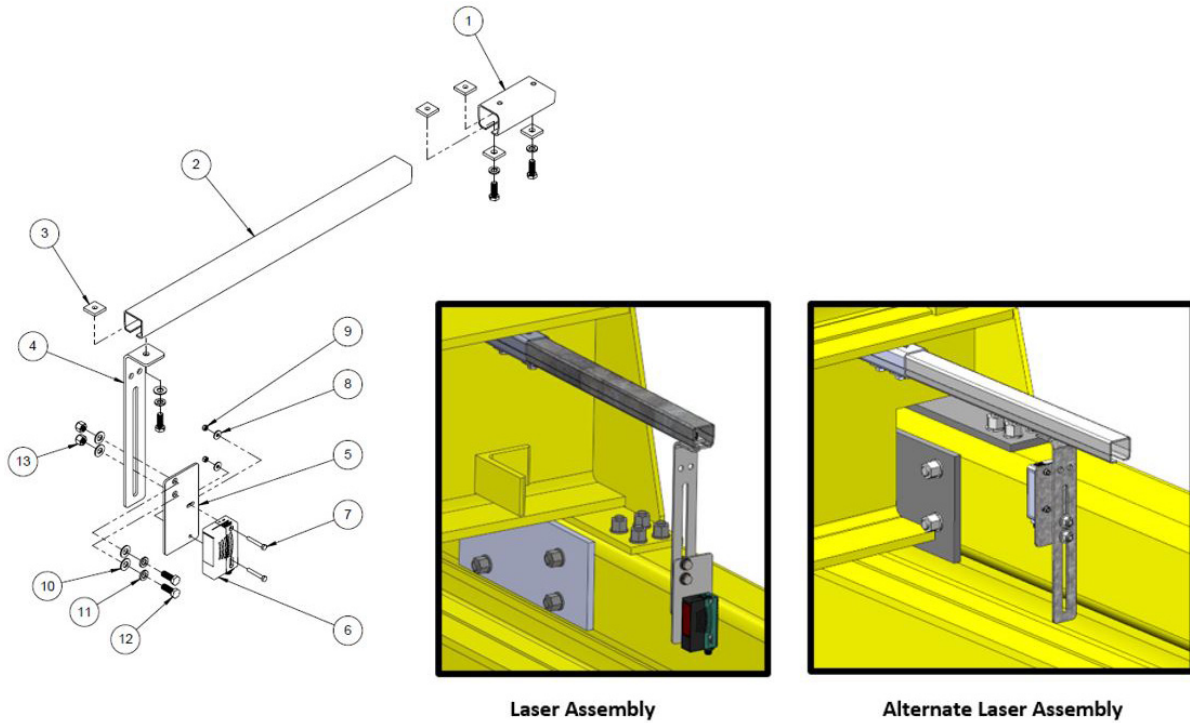
Intelli-Protect™ 50 m Configurable systems contain Class 1 lasers with a 660 Nm wavelength. Although the laser is eye-safe, it is recommended that no one look directly into the laser with their eye close to the lens of the laser unit. Do not open the laser unit to service it since there are no serviceable parts inside.

The Intelli-Protect 50 m System measures the distance between the trolley or bridge mounted laser lens and the target reflector. There must be no projections on the crane that may extend in front of either (or both) the laser unit or the reflector.

Make sure the laser is mounted such that nothing can come between the laser's view of the reflector.

Determine the mounting position for the laser and the target such that the center of the laser's faceplate and the center of the reflector are the same distance above the plane the crane rails are in. The laser and reflector center point should also be the same distance from the rails. This is the most important part of a successful installation since the laser beam must stay on the reflector at all range points anywhere in the bay.

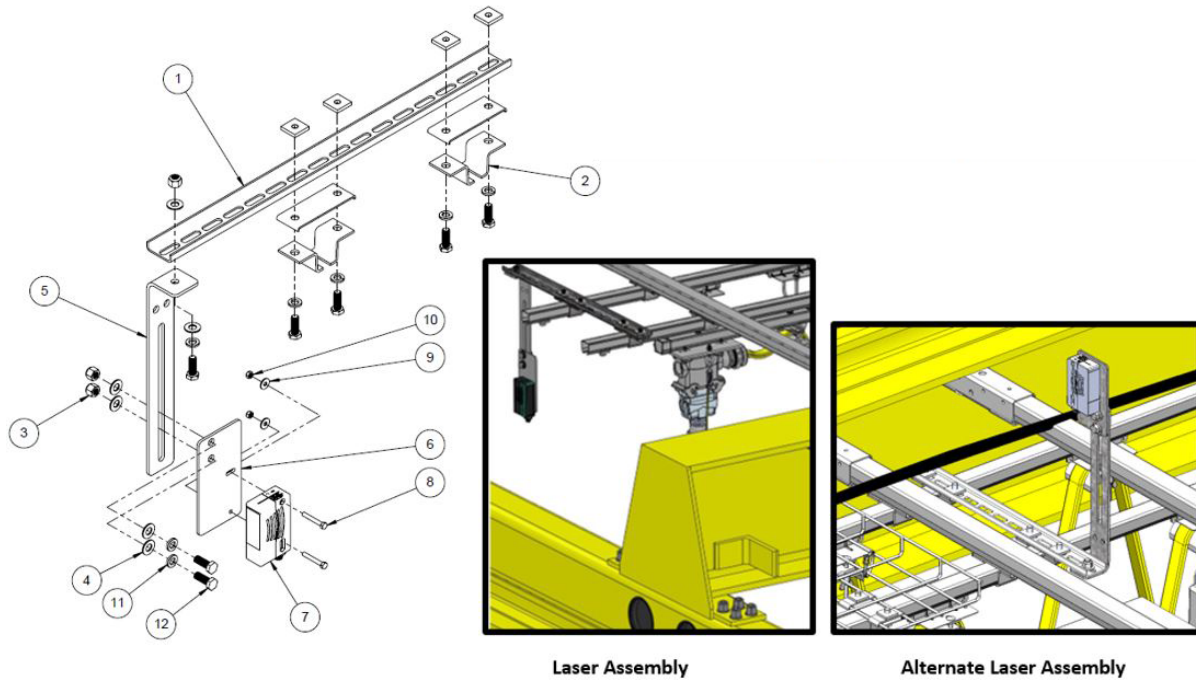
2.4.1 Trolley Motion 50 m



Item No.	Description	Qty
1	Weld Cross Arm Socket	1
2	F-12CT10 C-Track 12GA	1
3	F-A005C Square Nut Tapped	1
4	Bracket, Slotted, 50 m Sensor, Reflector Trolley and Bridge Motion	1
5	Bracket, Flat, 50 m Sensor Mount, Trolley and Bridge Motion	1
6	50 m Sensor	1
7	Hex-Head Cap Screw, M5 x 35, Steel, Zinc-Plated	2
8	Flat Washer, M5	2
9	Nut, Nylon, M5	2
10	Washer, 3/8 SAE	5
11	Lock Washer, 3/8	3
12	Hex Cap Screw, Shallow Head, 3/8-16 x 1	3
13	Nut, Nylon, 3/8	2

Figure 2-8: Girder Mounting (Weld Mount to Bridge)

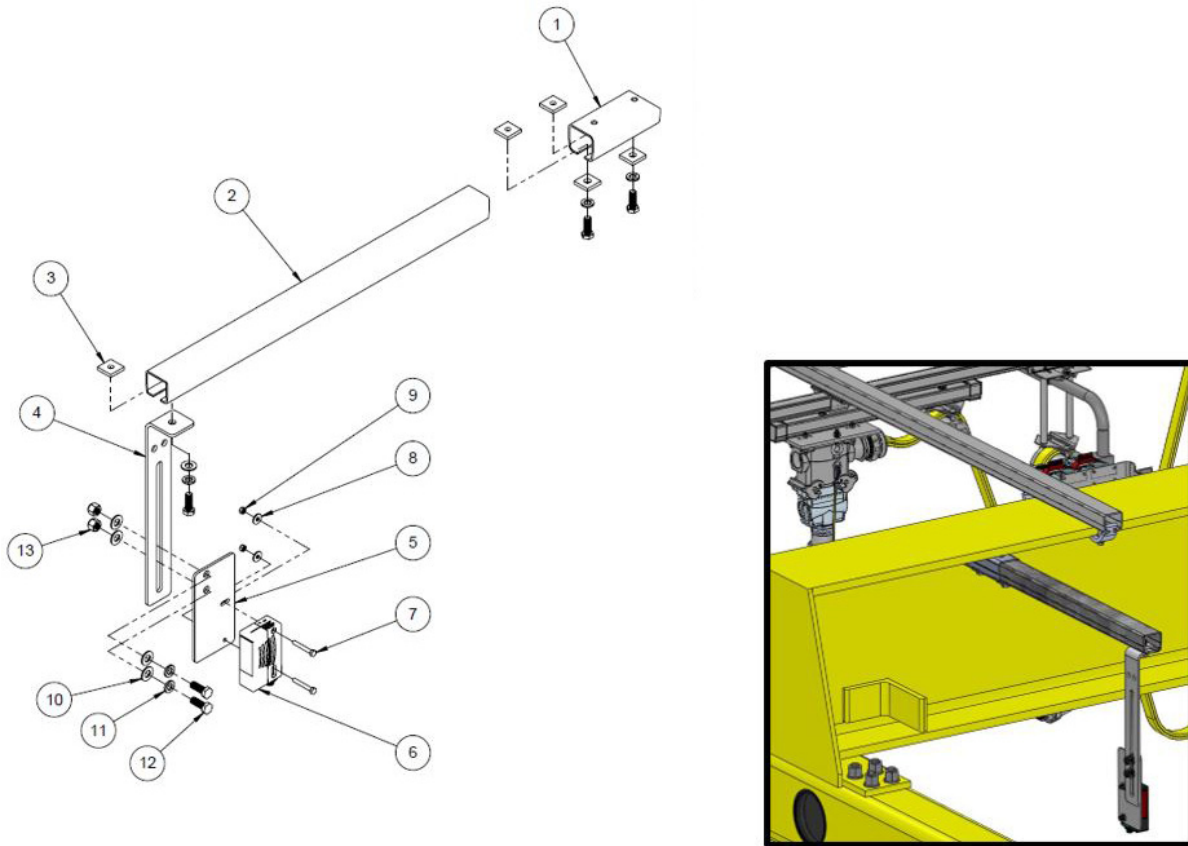
2.4.2 Bridge Motion 50 m



Item No.	Description	Qty
1	BKS-F24-G Flange Mount BR	1
2	F-CTH Low-Profile Hanger	2
3	Nut, Nylon, 3/8	3
4	Washer, 3/8 SAE	6
5	Bracket, Slotted, 50 m Sensor, Reflector Trolley and Bridge Motion	1
6	Bracket, Flat, 50 m Sensor Mount, Trolley and Bridge Motion	1
7	50 m Sensor	1
8	Hex-Head Cap Screw, M5 x 35, Steel, Zinc-Plated	2
9	Flat Washer, M5	2
10	Nut, Nylon, M5	2
11	Lock Washer, 3/8	3
12	Hex Cap Screw, Shallow Head, 3/8-16 x 1	3

Figure 2-9: Festoon Side Mounting

Weld Mount to Bridge Solution



Item No.	Description	Qty
1	Weld Cross Arm Socket	1
2	F-12CT10 C-Track 12GA	1
3	F-A005C Square Nut Tapped	1
4	Bracket, Slotted, 50 m Sensor, Reflector Trolley and Bridge Motion	1
5	Bracket, Flat, 50 m Sensor Mount, Trolley and Bridge Motion	1
6	50 m Sensor	1
7	Hex-Head Cap Screw, M5 x 35, Steel, Zinc-Plated	2
8	Flat Washer, M5	2
9	Nut, Nylon, M5	2
10	Washer, 3/8 SAE	5
11	Lock Washer, 3/8	3
12	Hex Cap Screw, Shallow Head, 3/8-16 x 1	3
13	Nut, Nylon, 3/8	2

Figure 2-10: Non-festoon Side Mounting

2.4.3 50 m Laser Wiring

50m LASER OPTIONS

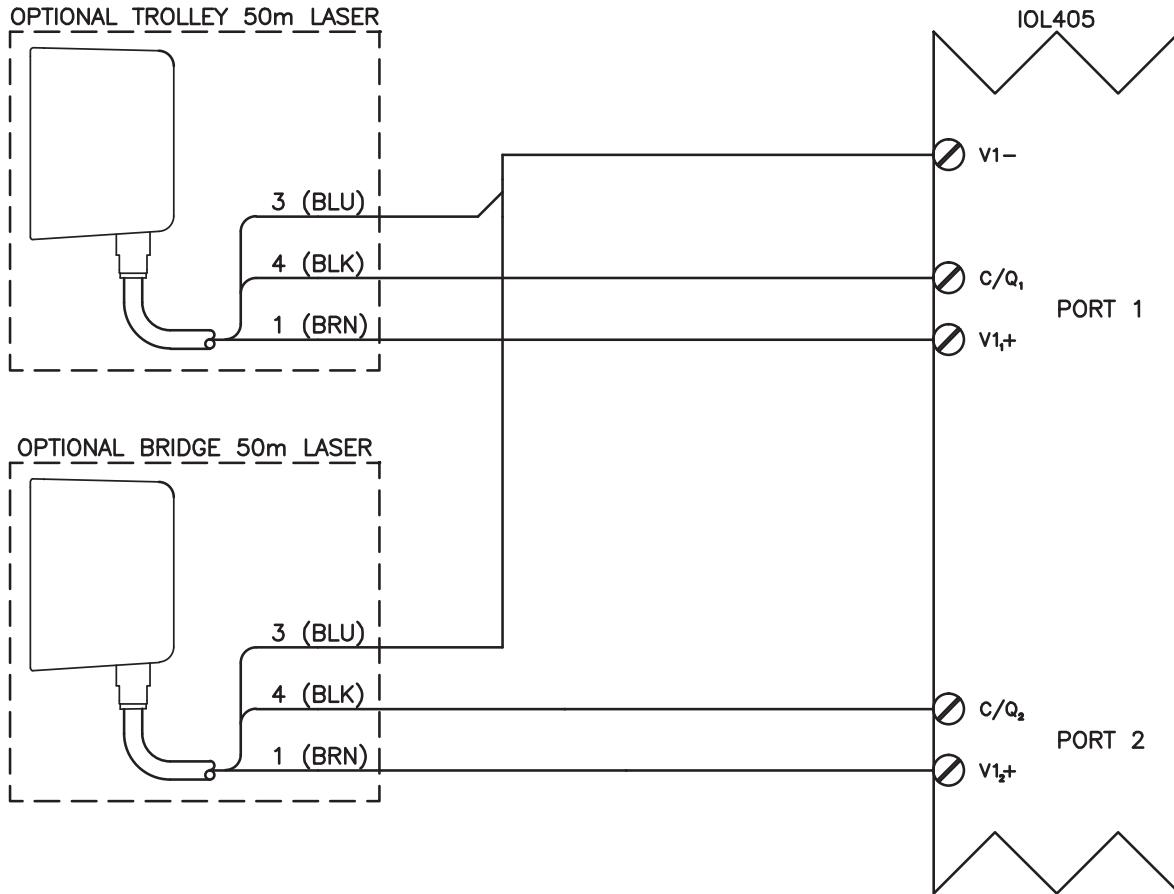


Figure 2-11: 50 m Laser Options

2.5 150 m and 300 m Laser Installation and Wiring



CAUTION

Intelli-Protect 150 and 300 m Configurable systems contain Class 1 measurement and Class 2 alignment lasers with visible and invisible laser radiation. Do not look at the beam. The irradiation can lead to irritation especially in a dark environment. Do not open the laser unit to service it since there are no serviceable parts inside.

The Intelli-Protect 150 m and 300 m Systems measure the distance between the trolley or bridge mounted laser lens and the target reflector. There must be no projections on the crane that may extend in front of either (or both) the laser unit or the reflector.

Make sure the laser is mounted such that nothing can come between the laser's view of the reflector.

Determine the mounting position for the laser and the target such that the center of the laser's faceplate and the center of the reflector are the same distance above the plane the crane rails are in. The laser and reflector center point should also be the same distance from the rails. This is the most important part of a successful installation since the laser beam must stay on the reflector at all range points anywhere in the bay.

The visible alignment laser is not centered with the invisible infrared measurement beam. **See Laser Alignment Instructions on page 28** before proceeding to mount laser reflectors.

NOTE: Alignment (pointer) laser will blink at approximately 1 Hz when target signal is lost, and will flash for an additional 2 minutes before deactivating automatically.

When mounting reflectors, keep the alignment beam (laser pointer) and corresponding invisible measurement beam completely on target, and do not allow a beam to partially fall off a reflector's edge. The alignment laser should be enabled during setup.

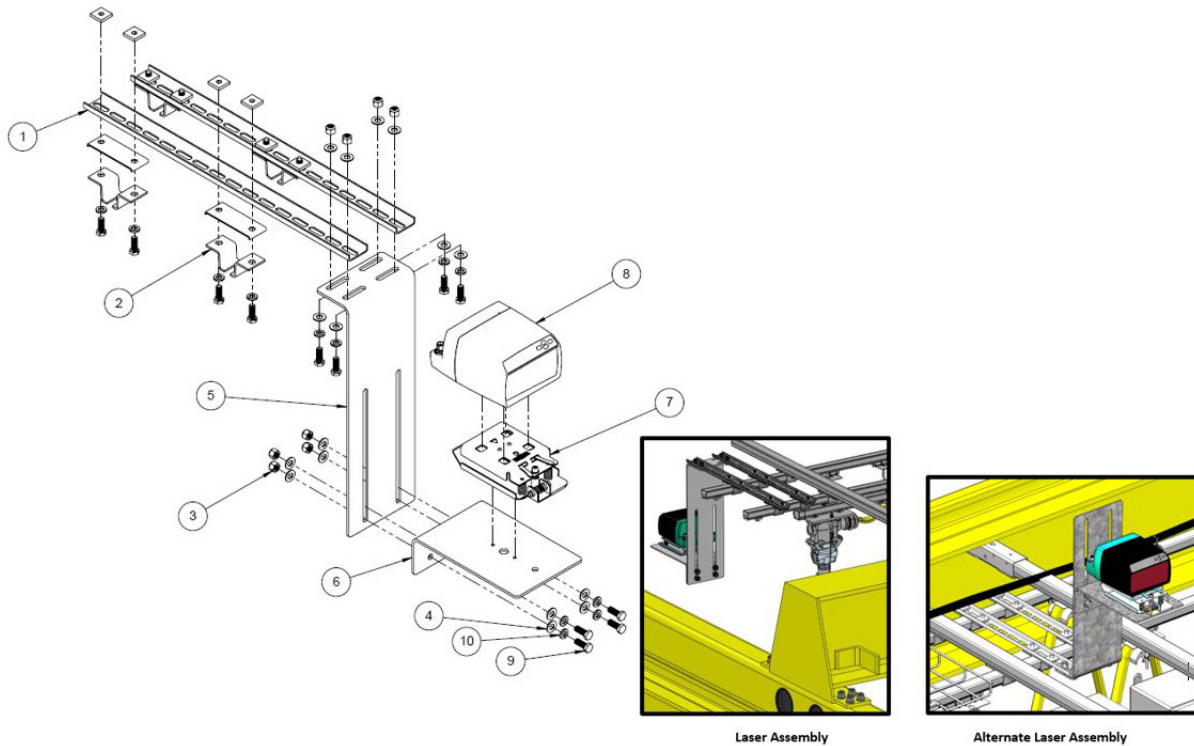
The table below may be used to identify how far off center a beam may stray before a partial loss of signal will occur.

Example: At 150 m, the infrared measurement beam diameter is 35 cm. The total reflector width of the recommended 2-wide setup is 122 cm (61 cm reflector). There will be 43.5 cm on each side of the measurement beam on a perfectly centered system. This is the off-center horizontal tolerance value.

Example Horizontal off-center tolerance: $(122 \text{ cm} - 35 \text{ cm}) / 2 = 43.5 \text{ cm}$

Laser	Beam Diameter	Beam Tolerances Off Center		Reflector Width	Reflector Height
		Horizontal	Vertical		
@ 150 m	35 cm	+/- 43.5 cm	+/- 13 cm	122 cm (2 wide)	61 cm (1 high)
@ 300 m	65 cm	+/- 59 cm	+/- 28.5 cm	183 cm (3 wide)	122 cm (2 high)

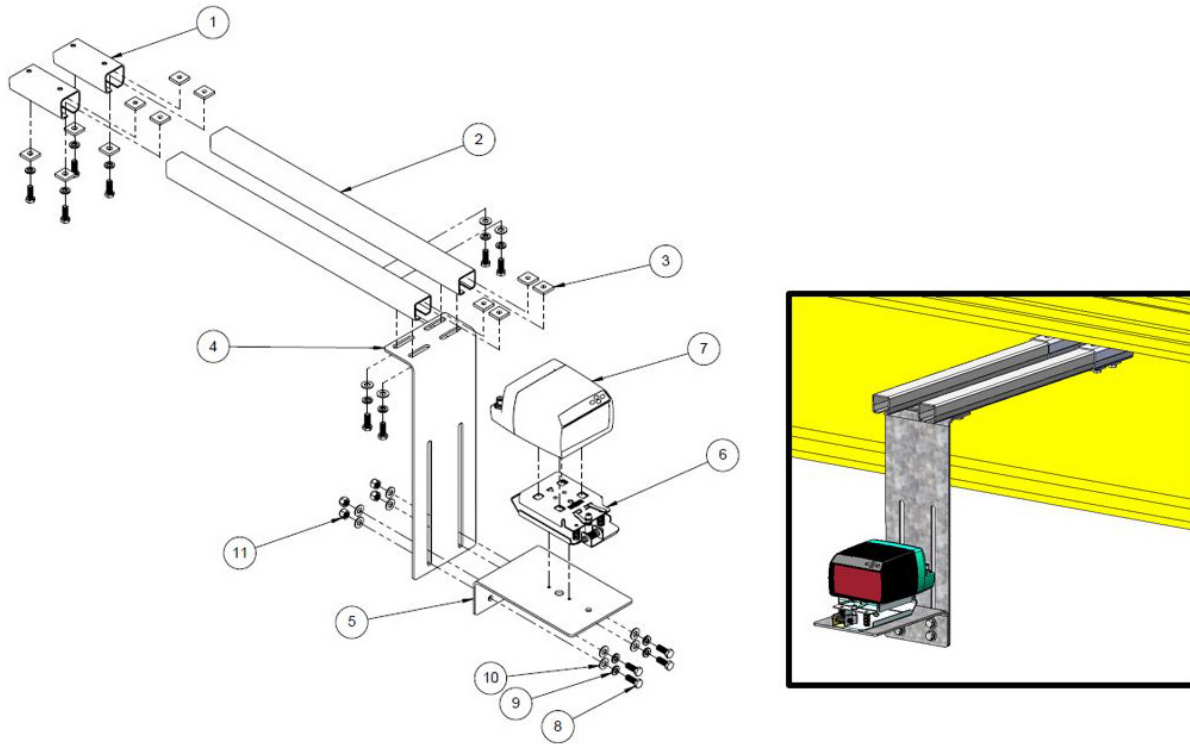
2.5.1 Bridge Motion 150 m / 300 m Laser



Item No.	Description	Qty
1	BKS-F24-G Flange Mount BR	2
2	F-CTH Low-Profile Hanger	4
3	Nut, Nylon, 3/8	8
4	Washer, 3/8 SAE	16
5	Bracket, Slotted, 150-300 m Sensor, Bridge Motion	1
6	Bracket, 150-300 m Sensor Mount, Bridge Motion	1
7	Bracket, 150-300 m Sensor Mount	1
8	Intelli-Protect Sensor	1
9	Hex Cap Screw, Shallow Head, 3/8-16 x 1	8
10	Lock Washer, 3/8	8

Figure 2-12: Festoon Side Mounting

Weld Mount to Bridge Solution



Item No.	Description	Qty
1	Weld Cross Arm Socket	2
2	F-12CT10 C-Track 12GA	2
3	F-A005C Square Nut Tapped	4
4	Bracket, Slotted, 150-300 m Sensor, Bridge Motion	1
5	Bracket, 150-300 m Sensor Mount, Bridge Motion	1
6	Bracket, 150-300 m Sensor Mount	1
7	Intelli-Protect Sensor	1
8	Hex Cap Screw, Shallow Head, 3/8-16 x 1	8
9	Lock Washer, 3/8	8
10	Washer, 3/8 SAE	12
11	Nut, Nylon, 3/8	4

Figure 2-13: Non-festoon Side Mounting

2.5.2 150 m and 300 m Laser Wiring

150–300m LASER OPTIONS

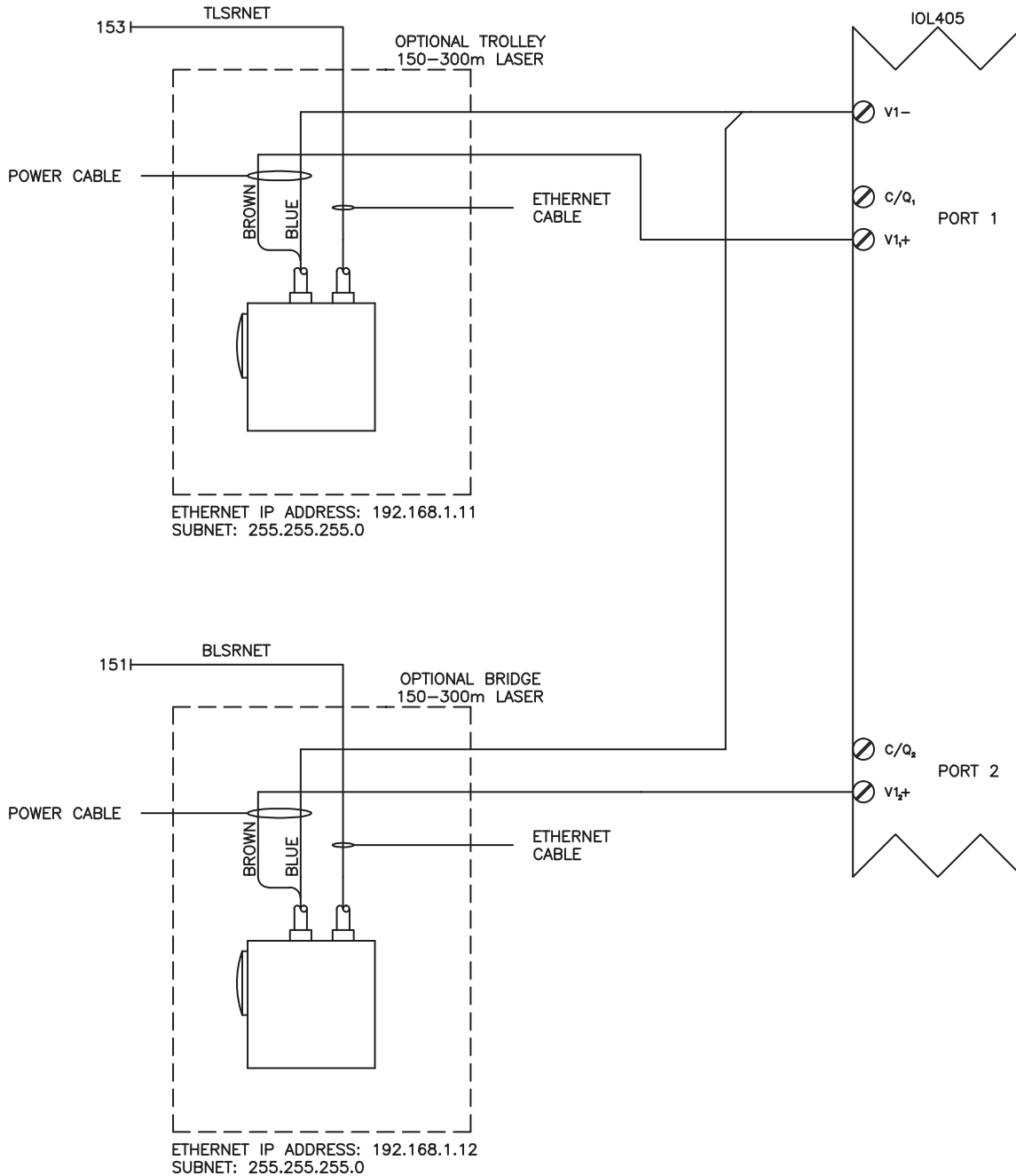


Figure 2-14: 150 m and 300 m Laser Options

2.6 Laser Alignment Instructions

When making an adjustment, ensure that the laser pointer is offset to the measuring lens. The adjustment applies to both reflector types (foil and plastic).

Perform the adjustment at maximum distance. At larger distances, perform the adjustment with the reflector at a distance of not less than 40 m.

The measurement beam to the laser pointer is offset 23 mm horizontally and 19 mm vertically.

Checking the Alignment

1. The factory default setting for the laser pointer in the menu is “Auto.”

If the sensor does not detect a target, the laser pointer flashes at a frequency of approximately 1 Hz.

2. Align the sensor if necessary.

As soon as the distance measurement device has detected a target, the laser pointer flashes for an additional two minutes before deactivating automatically.

The beam position in dynamic mode can be checked by performing a test drive with the laser pointer switched on.

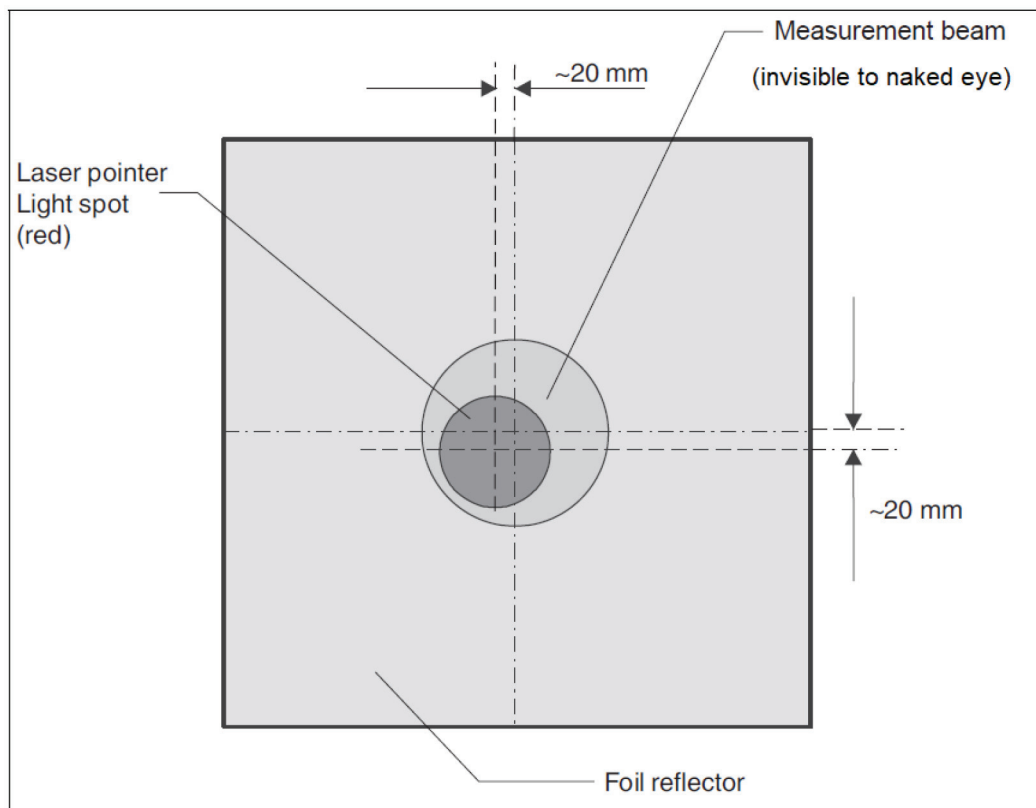


Figure 2-15: Aligning the Sensor

2.7 Light Stack Installation

The light stack that is provided with the Intelli-Protect No-Fly Zone, includes a horn to provide visual and audible notifications. Install the light stack in a location visible to the operator.

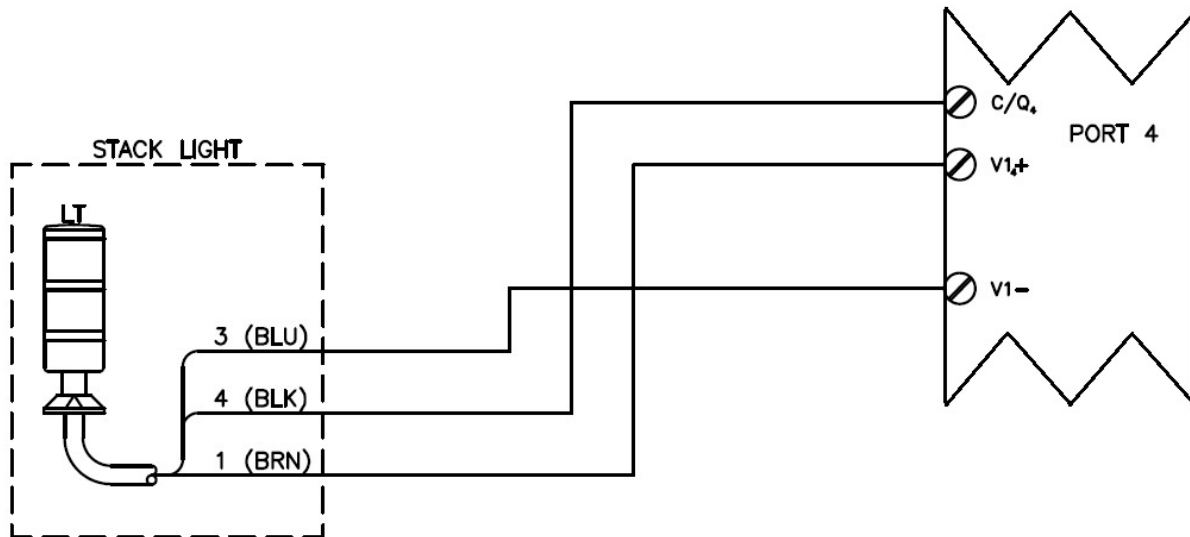


Figure 2-16: Light Stack Install

3 Power and Control Wiring

The following diagram shows terminal block connection points for power and control wiring for configurable No-Fly Zones. 115 VAC, 3 Amp, 60 Hz is customer supplied. Power and control wiring should follow all necessary national and local standards.

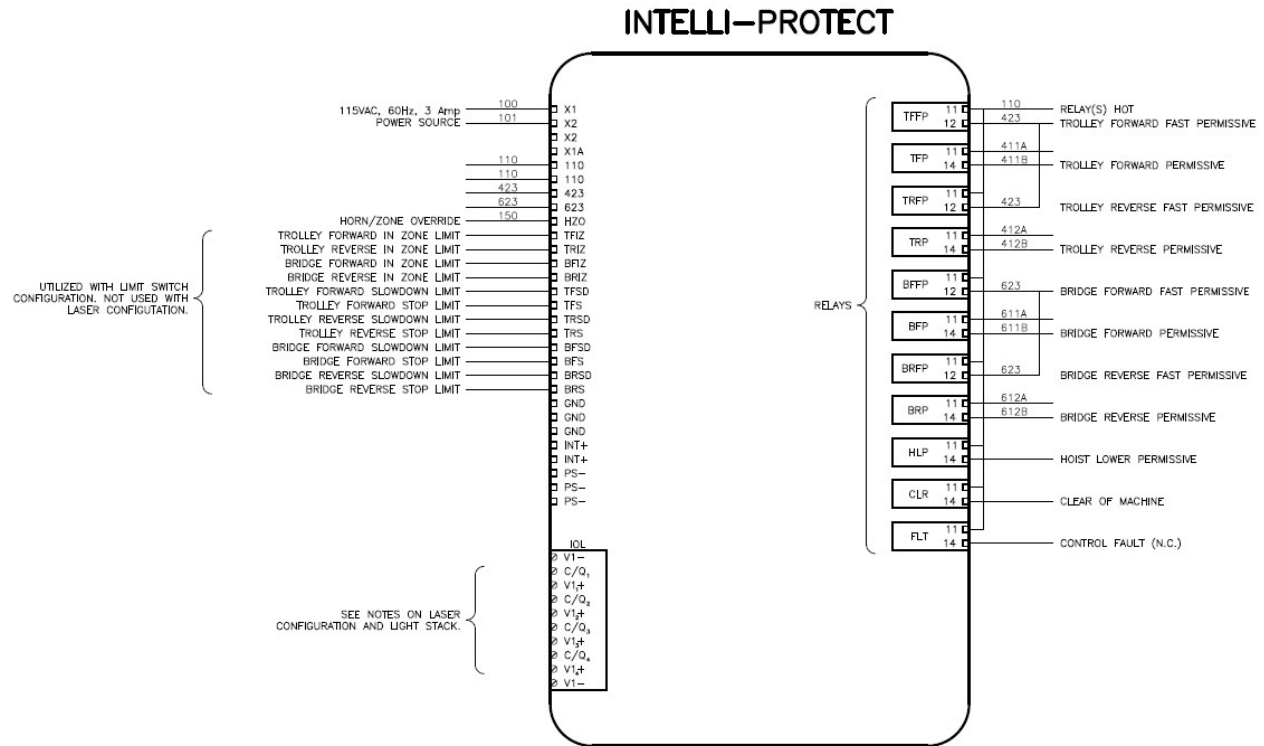


Figure 3-1: Terminal Block Connection Points

Factory-installed removable jumpers are included to enable travel speed permissives when desired for trolley and bridge motions.

- Configurable systems connect directly from the field installed lasers to the IO-Link module (Protected, Stop and Slow Down Zones are configured through the user interface)
- The light stack connects directly from the field installed light stack to the IO-Link module
- Horn/Zone Override input is an optional input for configurable No-Fly Zones to permit the crane to go over the top of a No-Fly Zone (needs to take into account all hoists and zones)
- Machine Down input is an optional input for configurable or fixed location No-Fly Zones to permit the crane to go over the top of a No-Fly Zone and is only available for Zone 1 (Field wiring and circuit design is designed on site by the customer and needs to take into account all hoists and zones)
- Hoist Lower Permissive output provides a control signal to an external controller or hoist drive signaling that the crane and hoist are over the No-Fly Zone to prevent the hoist from lowering in the No-Fly Zone (Used for both hoist upper limit and machine down configurations)
- Clear of Machine Permissive output provides a control signal to an external controller or hoist drive signaling that the crane and hoist are clear of the No-Fly Zone
- Trolley and bridge wiring to external controller, variable frequency drives or contractor control are found in **Intelli-Protect Control Outputs on page 33**.

- Control Fault output for optional connection to a fault input on an external drive or to connect to other desired devices such as external enunciators in the event of an NFZ Fault. Faults include protected zone penetration, loss of laser communication, or other system faults.

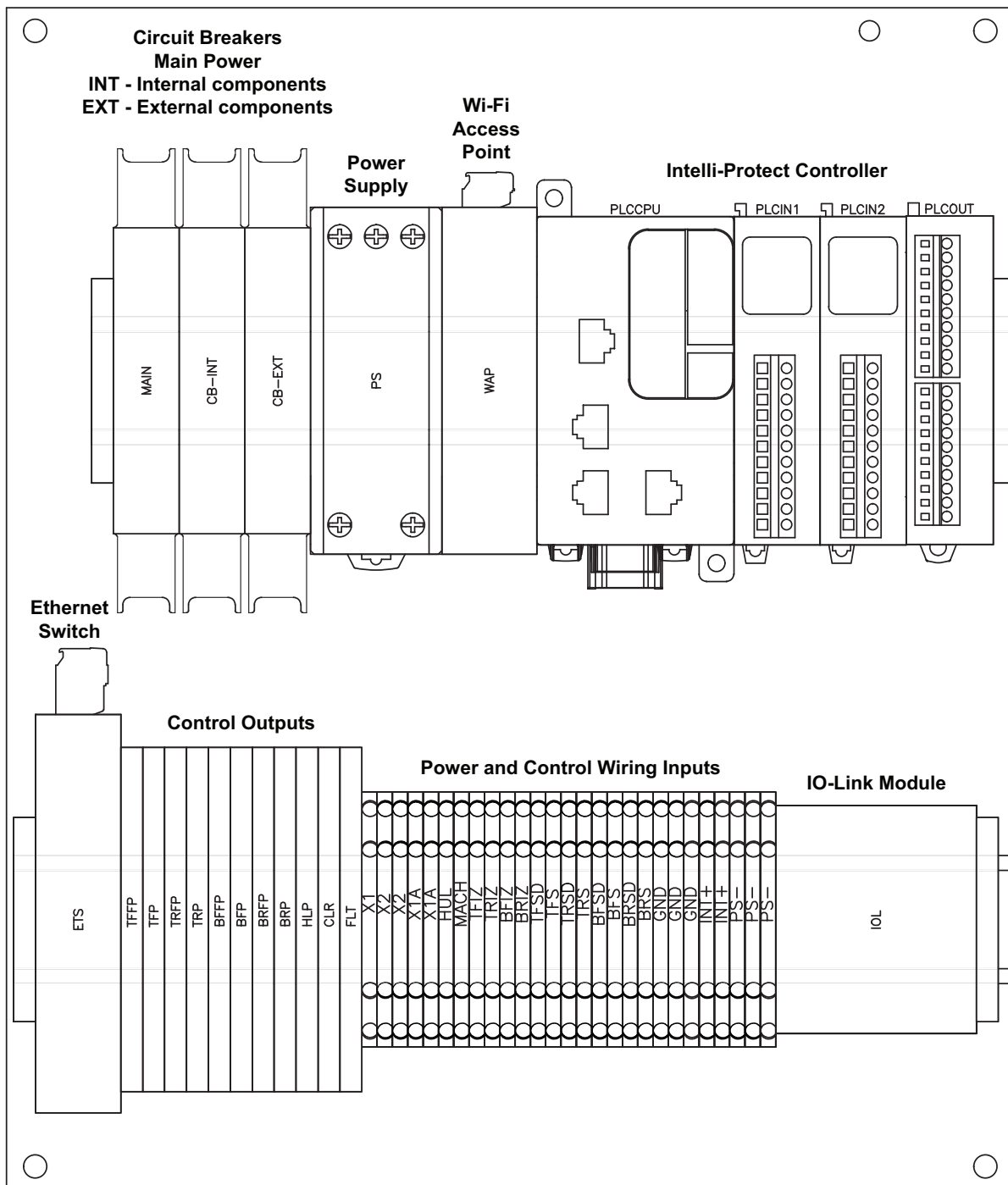


Figure 3-2: Enclosure Overlay Drawing

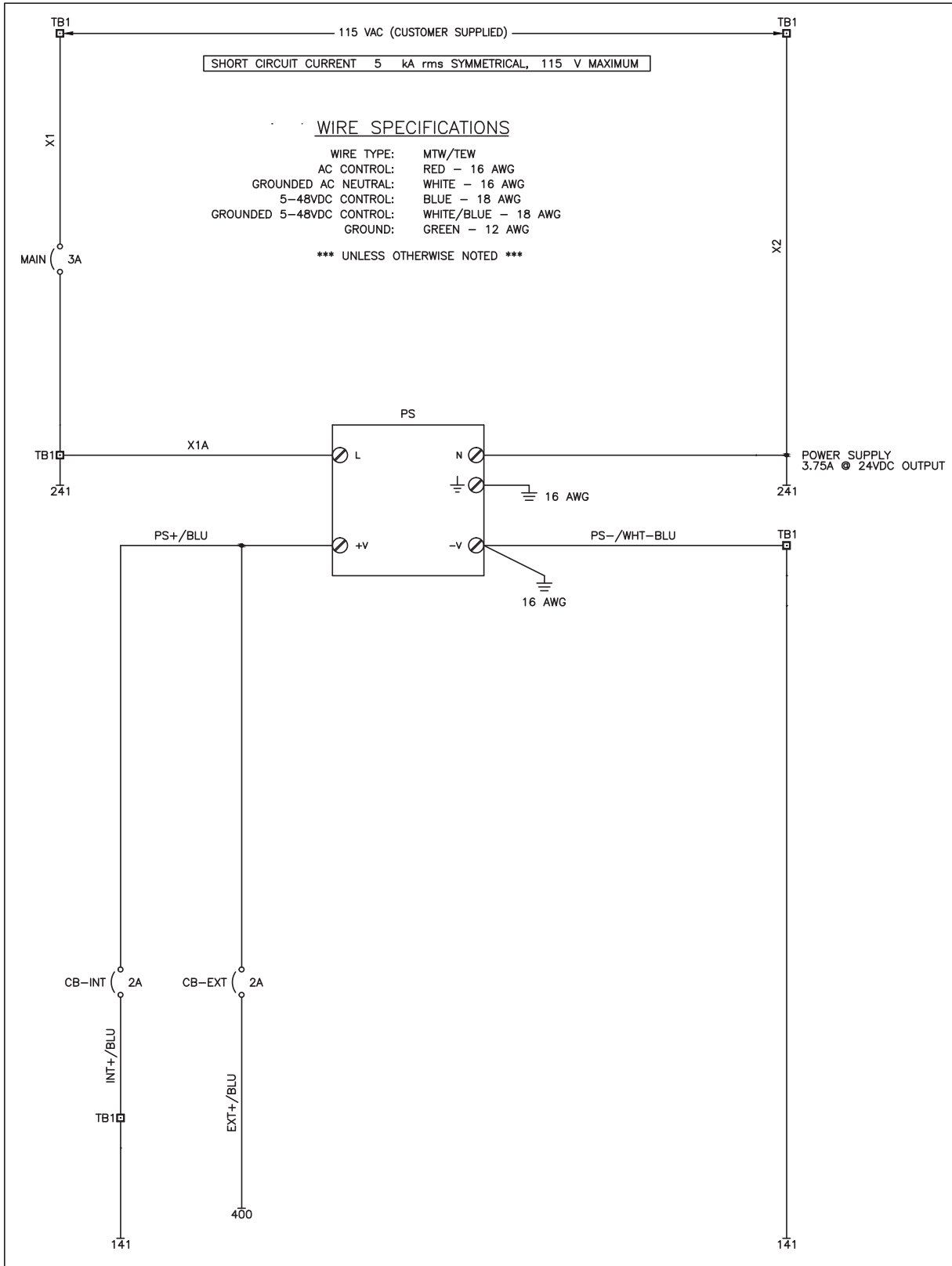


Figure 3-3: Internal Power Diagram (for reference only)

3.1 Intelli-Protect Control Outputs

Inside the system panel, locate the terminal block corresponding to the indicated relay labels.

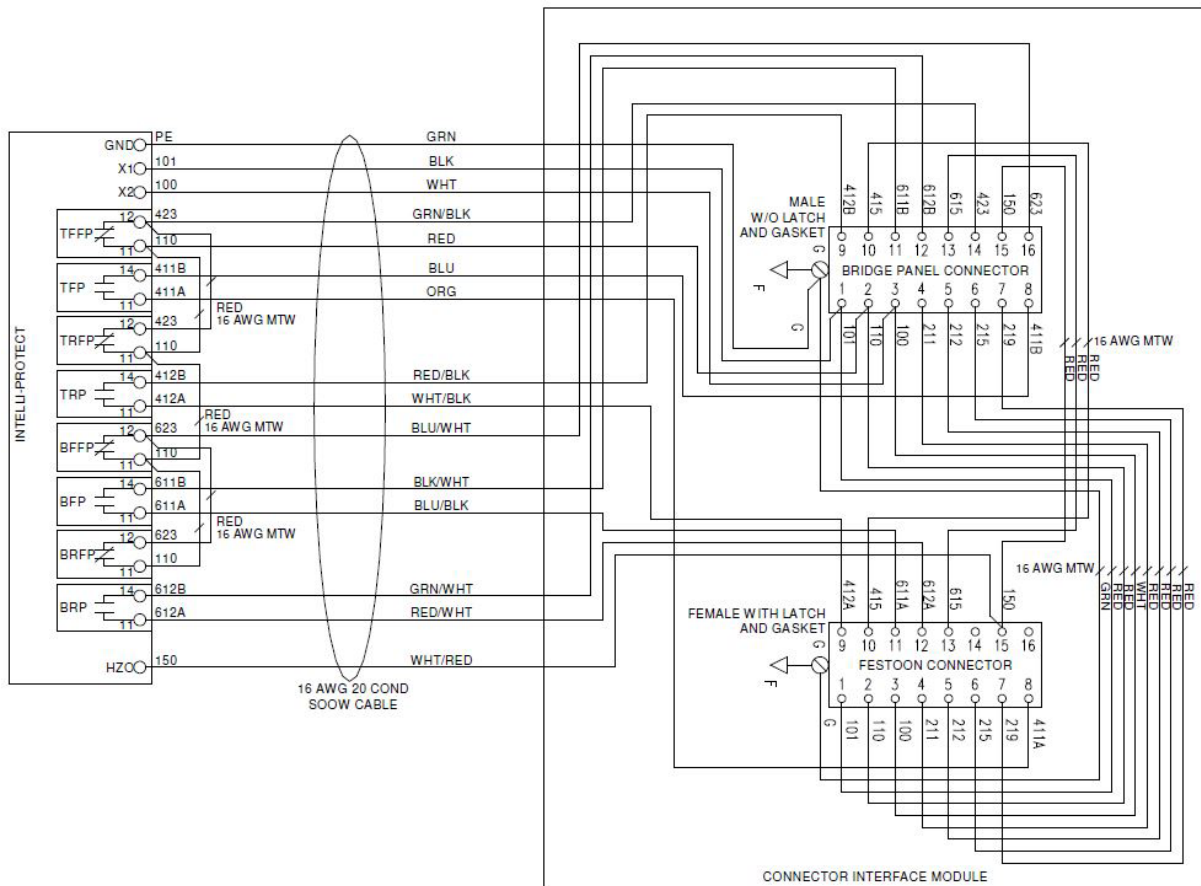


Figure 3-4: Relay Labels

3.1.1 Control Outputs

Designed for fail-safe operation, the control outputs are wired to a drive that controls the trolley, bridge and hoist motions. The Fast Permissive will allow the bridge or trolley to run at full speed when outside of the No-Fly Zone Slow Down Boundary. If the crane enters the Slow Down Zone these relays would change state. The Forward/Reverse Permissive will allow the bridge or trolley to run when outside of the No-Fly Zone Stop Boundary. If the crane enters the Stop Zone, these relays would change state.

- Forward / Reverse Fast Permissive used to allow the bridge or trolley to run at full speed
- Forward / Reverse Permissive used to allow the bridge or trolley to run
- Hoist Lower Permissive used to allow the hoist to lower when out of the No-Fly Zone

Machine Down input is an optional input for configurable or fixed location No-Fly Zones to permit the crane to go over the top of a No-Fly Zone and is only available for Zone 1. (Field wiring and circuit design is designed on site by the customer and needs to take into account all hoists and zones.)

- Hoist Lower Permissive output provides a control signal to an external controller or hoist drive signaling that the crane and hoist are over the No-Fly Zone to prevent the hoist from lowering in the No-Fly Zone (used for both hoist upper limit and machine down configurations)
- Clear of Machine Permissive output provides a control signal to an external controller or hoist drive signaling that the crane and hoist are clear of the No-Fly Zone applies to Zone 1 only.

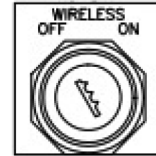
4 Configurable No-Fly Zone Setup

4.1 Connecting to Web Server

Step 1. Set up network connection to the web server.

Ensure the connection to your Intelli-Protect panel is on and the control panel is powered up.

By default, DHCP (Dynamic Host Configuration Protocol) is enabled on the wireless router.



Step 2. Connect to the web server on the Programmable Logic Controller (PLC).

- a. Using your personal electronic device, smartphone, tablet, or PC, go into the Wi-Fi settings and locate the MagnetekNFZ network.
- b. Enter the password: MagnetekNFZ.

Step 3. Open the NFZ Configuration page through the browser.

Open a browser such as Chrome, Safari, or Edge, and enter the following IP address in the search bar to access the configuration page:

IP Address 192.168.1.1:8080/webvisu.htm

Step 4. Use the No-Fly Zone Program to configure your No-Fly Zone system:

Monitor Screens

Overview – View all enabled No-Fly Zones

Inputs – View ON / OFF state of Zone Bypass, Hoist Upper Limit Tripped, and Machine Lowered inputs

Outputs – View ON / OFF state for outputs:

Trolley and Bridge Slow (Orange) and Stop (Red)

Clear of Machine (Orange)

Fault to Drive (Red)

Light Stack: NFZ Ready (Green), Zone Occupied (Amber), NFZ Fault (Red)

Alarms – View active alarms

Config Screens

Trolley – Setup Trolley Span, and Slow and Stop Distance

Bridge – Setup Bridge Span, and Slow and Stop Distance

Zone – Setup and enable / disable up to 31 No-Fly zones

NOTE: You may disable the Intelli-Protect Wi-Fi system using the Wi-Fi key switch on the front panel after configuration to avoid interference with other wireless systems.

4.2 Configurable Initial Setup

For initial setup and zone configuration the following steps should be implemented:

1. Power up the system
2. Status light Green for Power on, red flashing for no zones configured (NO FAULT) (No Horn)
3. Configure the bridge and trolley distances
4. Configure Zone 1
 - a. Teach corner 1 moving crane or entering the data manually
 - b. Teach corner 2 moving crane or entering the data manually
 - c. Enable Hoist Upper Limit if needed
 - d. Enable Machine Down if needed
5. Move the crane out of the zone
6. Enable the Zone 1 (Checkbox indicates zone is enabled with a check mark)
7. Status light Green (Amber only if measured to be in the stop or slow down zone)
8. Test Zone
9. Repeat steps for Zones 2-31

If all zones are disabled using the user interface, the green light will stay on and a red light will flash (no horn).

4.3 How to Configure Travel Limits

Before defining your custom NFZs, follow the steps below to set your unique trolley and bridge span for the bay the crane is operating in.

Each main menu button opens a screen that appears separately and includes specific programming steps.

Begin with establishing the length of the Trolley and Bridge limit. After setting the Bridge and Trolley limits, you may continue ahead to configure your custom NFZs.

1. Configuration of Trolley and Bridge Limit

- a. Press the **Trolley Config** button
- b. Follow the Trolley Configuration steps
- c. Press the **Bridge Config** button
- d. Follow the Bridge Configuration steps

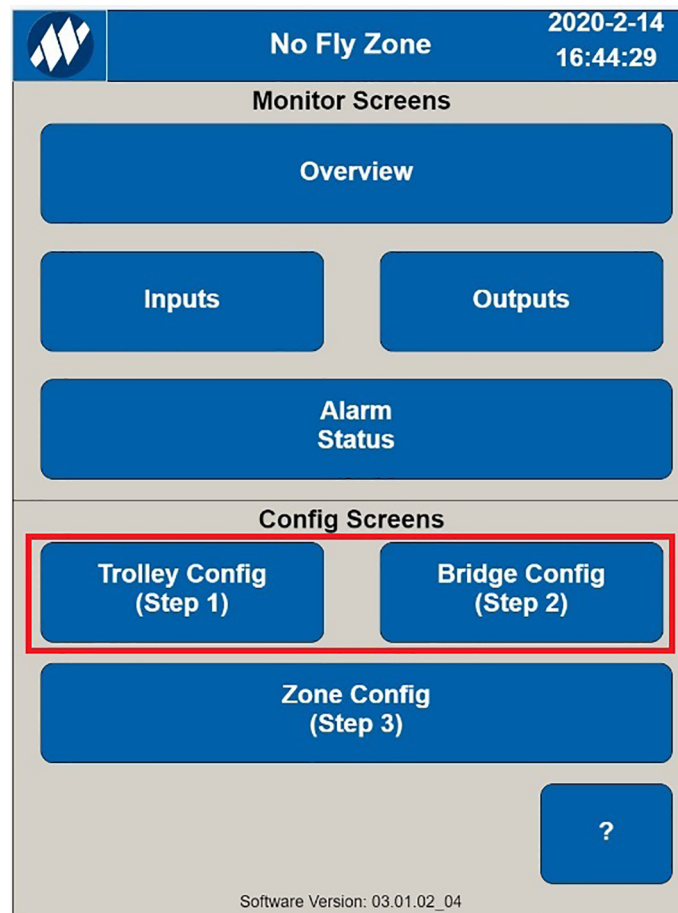


Figure 4-1: Configuring Trolley and Bridge Limit

4.3.1 Trolley Configuration Steps

Before defining the trolley limit, enter a description to explain the orientation of each side of the trolley such as “East” or “West.”

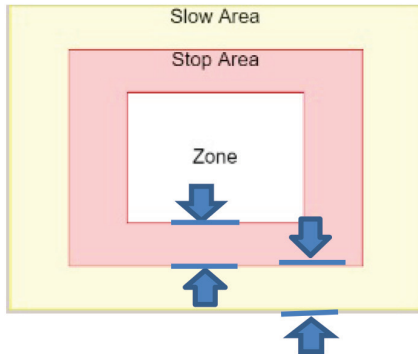
Position the trolley to the farthest position away from the trolley reflector so that the displayed laser value is greatest, and then press the Teach button to configure the limit of the trolley.

If the trolley cannot be moved to the farthest position, enter a trolley position value manually.



CAUTION

Keep in mind the size of the material being lifted when setting Slowdown and Stop NFZ distances. For simplicity, the no-load hook position may be used to set the NFZ corner boundaries, but the radius of the material is also a factor when creating proper Slowdown and Stop distances.



Configure the Zone based on the slow down and stop zones needed to decelerate and stop before contacting protected zone. If the protected zone boundary is passed a fault will occur.

Figure 4-2: Zone Configuration

1. Trolley Configuration

- a. Press the **Forward Description** text box
- b. Enter the desired description for Forward
- c. Press the **Reverse Description** text box
- d. Enter the desired description for Reverse
- e. Move Trolley to the End of Travel position
- f. Press the **Teach** button
- g. Enter a Slowdown Distance:
 - Distance it takes a trolley to decelerate from full speed to slowdown speed
- h. Enter a Stop Distance:
 - Distance it takes a trolley to decelerate from slowdown speed to zero speed

Trolley		2020-1-21 22:29:07
Forward Description	East	
Reverse Description	West	
Trolley Span (Scales Trolley on Overview Screen)		
Trolley Position	3.94	Feet
Teach	114.83	Feet
Slowdown/Stop Distance		
Slowdown Distance	3.00	Feet
Stop Distance	1.00	Feet
Main		?

Figure 4-3: Configuring Trolley

4.3.2 Bridge Configuration Steps

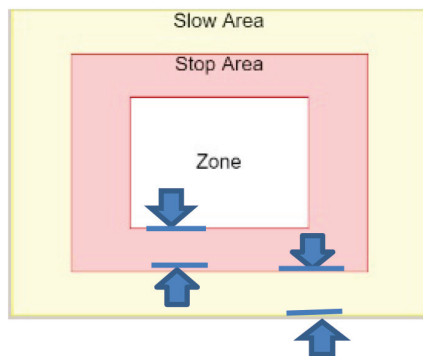
Before defining the bridge limit, enter a description to explain the orientation of each side of the bridge such as “North” or “South.”

Position the bridge to the farthest position away from the bridge reflector so that the displayed laser value is greatest, and then press the Teach button to configure the limit of the bridge.



CAUTION

Keep in mind the size of the material being lifted when setting Slowdown and Stop NFZ distances. For simplicity, the no-load hook position may be used to set the NFZ corner boundaries, but the radius of the material is also a factor when creating proper Slowdown and Stop distances.



Configure the Zone based on the slow down and stop zones needed to decelerate and stop before contacting protected zone. If the protected zone boundary is passed a fault will occur.

Figure 4-4: Zone Configuration

1. Bridge Configuration

- a. Press the **Forward Description** text box
- b. Enter the desired description for Forward
- c. Press the **Reverse Description** text box
- d. Enter the desired description for Reverse
- e. Move Bridge to the End of Travel position
- f. Press the **Teach** button
- g. Enter a Slowdown Distance:
 - Distance it takes the bridge to decelerate from full speed to slowdown speed
- h. Enter a Stop Distance:
 - Distance it takes the bridge to decelerate from slowdown speed to zero speed

Bridge		2020-1-21 22:29:35
Forward Description	North	
Reverse Description	South	
Runway Length (Scales Runway on Overview Screen)		
Bridge Position	6.35	Feet
Teach	114.83	Feet
Slowdown/Stop Distance		
Slowdown Distance	3.00	Feet
Stop Distance	1.00	Feet
Main		?

Figure 4-5: Configuring Bridge

4.4 Zone Setup

To configure the location of a No-Fly Zone, press the Enable checkbox to disable the zone (**no check mark**) if enabled. On initial setup, all zones are disabled by default. Each zone is numbered from 1 to 31. Use the Previous and Next buttons at the top of the menu to scroll between all 31 zone configurations.

Each zone displays a user-customizable ID descriptor or name for added clarity.

Position the hoist at one corner of the desired zone and press the **Teach Initial Corner** button to store the initial corner position of the zone.

Position the hoist at the diagonal corner of the desired zone and press the **Teach Diagonal Corner** button to store the corner position and finalize the zone.

If needed the data can be entered manually by pressing on the measurement.

1. Zone Configuration

- a. Press the previous or next buttons until the desired zone number appears
- b. Press the Enable button to remove the checkbox if enabled
- c. Move hoist to one corner
- d. Press **Teach Initial Corner** button
- e. Move hoist to opposite diagonal corner
- f. Press **Teach Diagonal Corner** button
- g. Move the hoist away
- h. Press the Enable button to enable zone protection
- i. Press the ID field to enter a name

The screenshot shows the 'Zone 1 Config' interface. At the top, there is a header with a logo, the title 'Zone 1 Config', and the date '2020-2-26' and time '8:35:48'. Below the header are two blue buttons: 'Previous' and 'Next'. The main area contains an 'ID:' field with the text 'Middle NFZ Area'. Below this is an 'Enable' checkbox, which is currently unchecked and highlighted with a red box. Further down, there are two rows of configuration options. The first row is 'Trolley Position' with a value of '42.09 Feet'. The second row is 'Bridge Position' with a value of '28.35 Feet'. Below these are two sections for teaching corner positions. The first section is 'Teach Initial Corner' with two rows: 'T' with '44.78 Feet' and 'B' with '37.50 Feet'. The second section is 'Teach Diagonal Corner' with two rows: 'T' with '39.44 Feet' and 'B' with '31.04 Feet'. At the bottom, there are two blue buttons: 'Main' and a button with a question mark '?'.

Figure 4-6: Configuring and Enabling a Zone

4.4.1 Load Size Consideration

When configuring the No-Fly Zone, the dimensions of the material being moved by the overhead crane and hoist needs to be considered. The length and width of the largest materials being moved should guide the design of the zone to allow enough distance for slow down zone, stop zone and protected zone. In addition to the length and width, the height of the material needs to be taken into account for fly-over No-Fly Zones when using the Hoist Upper Limit input or Machine Down input to insure proper clearance over the top of the protected zone.

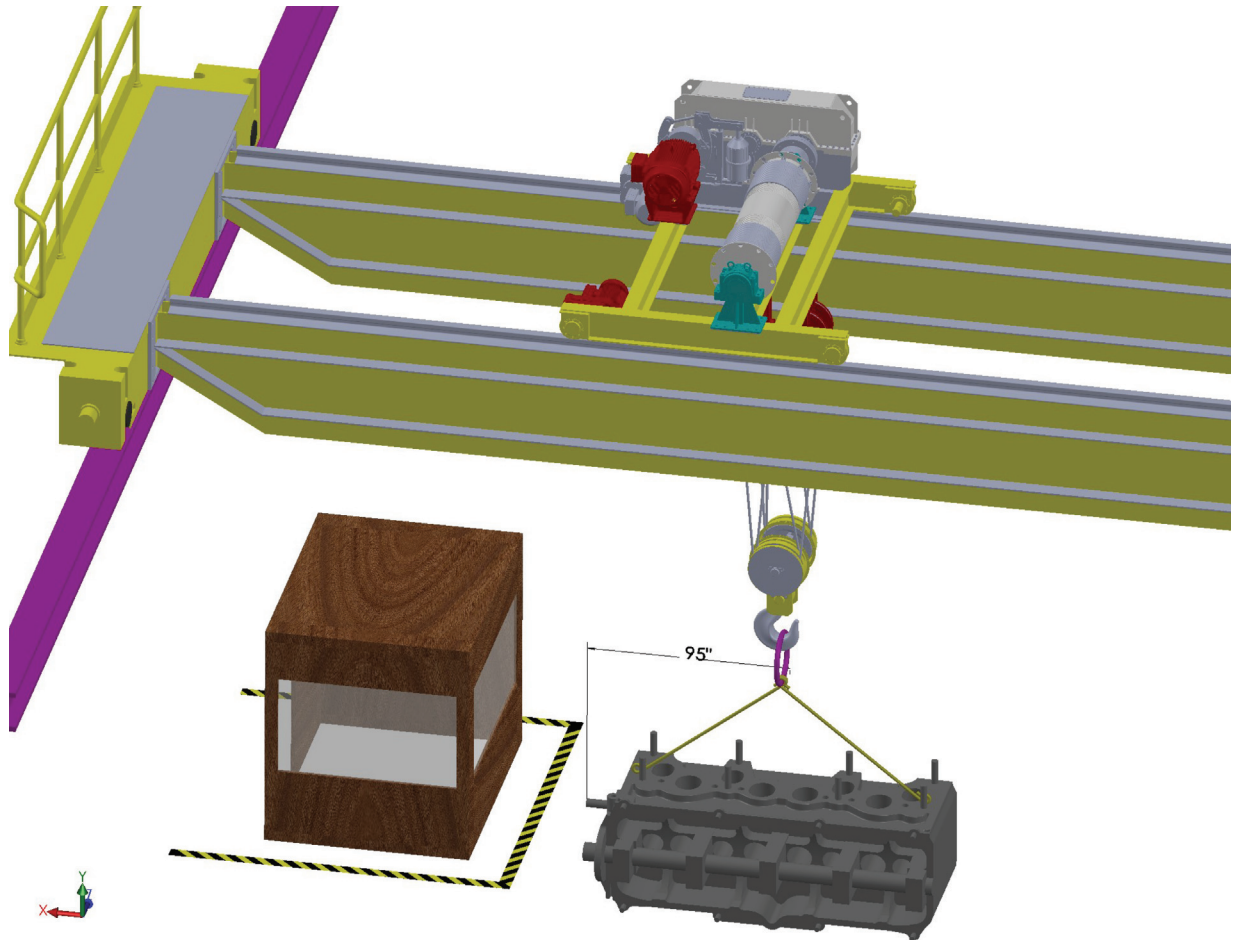


Figure 4-7: Load Size Consideration

4.5 Enabling Zones

After completing the setup of the trolley, bridge spans, the Slow Down Zone, Stop Zone and Protected Zone, press the enable button on the configuration screen. The enabled zone will now appear on the Overview screen. Use the enable/disable checkbox for maintenance in a zone, changing the dimensions or moving the zone to a new location.

Trolley and Bridge Corner zone values may be edited manually when a zone is enabled. Press the desired value to change.


Zone 1 Config		2020-2-26 8:36:12
Previous		Next
ID:	Middle NFZ Area	
	<input checked="" type="checkbox"/> Enable	
<input type="checkbox"/> Hoist Upper Limit	<input type="checkbox"/> Machine Down	
Trolley Position	42.13	Feet
Bridge Position	28.35	Feet
Teach Initial Corner	T	44.78 Feet
	B	37.50 Feet
Teach Diagonal Corner	T	39.44 Feet
	B	31.04 Feet
Main		?

Figure 4-8: Enabling a Zone

4.6 Hoist Upper Limit and Machine Down Configuration

An overridable No-Fly Zone can be configured by selecting the Hoist Upper Limit checkbox on the zone configuration screen. The input is provided by the customer to the NFZ controller by the horn pushbutton. When the override is active the horn will also sound.

The Machine Down checkbox on Zone One is available for optional use but is not part of the default wiring.



CAUTION

When configuring the No-Fly Zone, consider the dimensions of the material being moved by the overhead crane and hoist. The length and width of the largest materials being moved should guide the design of the zone to allow enough distance for slow down zone, stop zone and protected zone. When an override is activated all zones with the Hoist Upper Limit checkbox checked will be disabled. The horn serves as a reminder to observe caution while zones are disabled.

Zone 1 Config		2020-2-26 8:37:01
Previous		Next
ID:	Middle NFZ Area	
<input checked="" type="checkbox"/> Enable		
<input checked="" type="checkbox"/> Hoist Upper Limit		<input type="checkbox"/> Machine Down
Trolley Position	42.13	Feet
Bridge Position	28.35	Feet
Teach Initial Corner	T	44.78 Feet
	B	37.50 Feet
Teach Diagonal Corner	T	39.44 Feet
	B	31.04 Feet
Main		?

Figure 4-9: Hoist Upper Limit and Machine Down Configuration

4.7 Zone Overview

The Zone Overview screen displays the position, relative size and state of all enabled NFZs.

If a hoist moves into the slowdown region of a zone, the icon will display a blinking AMBER Zone.

If a hoist crosses into the stop region, the icon will display a solid AMBER Zone.

A fault will occur if the NFZ protected boundary is penetrated. The icon background will change to RED.

1. Zone Overview

- a. All enabled zones appear on this view
- b. Each zone displays a unique zone number
- c. Each zone displays a color code:
 - GREEN = NORMAL
 - BLINKING AMBER = INSIDE SLOWDOWN BOUNDARY
 - SOLID AMBER = INSIDE STOP BOUNDARY
 - RED = ZONE BREACHED
 - FLASHING RED = BYPASSED

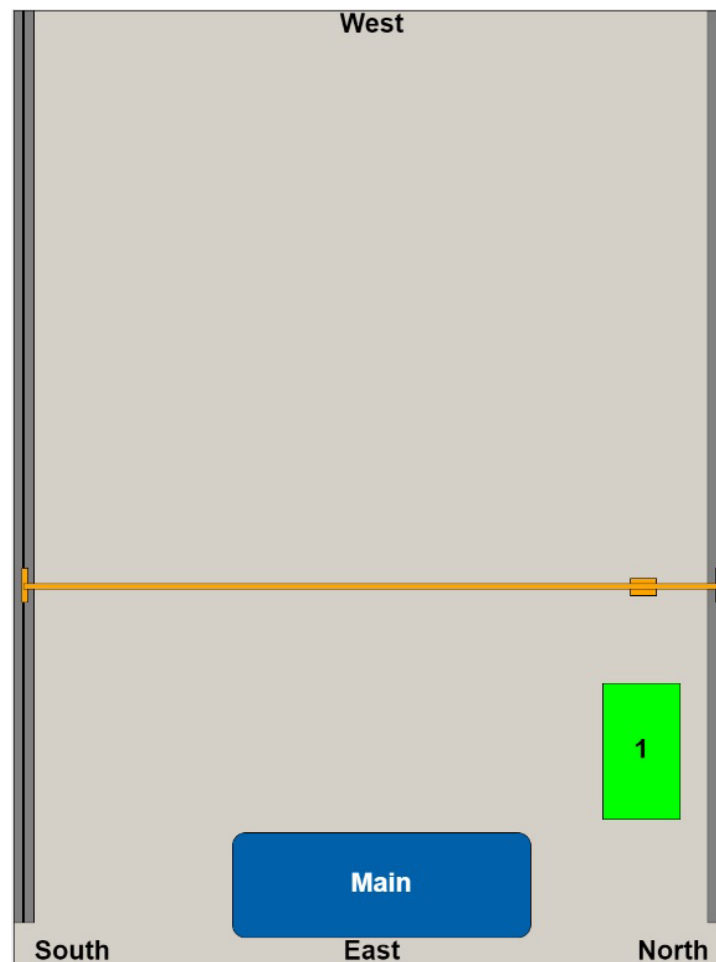


Figure 4-10: Zone Overview

5 Intelli-Protect™ Inputs and Outputs

Intelli-Protect supports the following system inputs and outputs that provide status indicators to aid in setup and troubleshooting:

1. Inputs

a. Zone Bypass Indicator

WHITE = Normal Operation
RED = Bypass Key Switch disabled

b. Hoist Upper Limit Indicator

WHITE = Hoist Lowered
GREEN = Hoist at upper limit

c. Machine Down / Lowered Indicator

WHITE = Machine up
GREEN = Machine lowered

d. Trolley and Bridge Motions

Forward, Reverse, Slow Down, Stop
and In Zone indications

GREEN = OK (clear of zone)
AMBER = Slow down zone
RED = Stop zone



Figure 5-1: Intelli-Protect Inputs

The output screen provides status indication for outputs from the No-Fly Zone controller. The indicators will match the external light stack provided with the system.

1. Outputs

a. Bridge and Trolley Motion

AMBER = Slowdown
 RED = Stop
 GREEN = OK

b. Hoist Lower Permissive

GREEN = Clear of Zone
 AMBER = In Zone

c. Clear of Machine

AMBER = In Zone
 GREEN = Clear of Machine

d. Control Fault

GREEN = OK
 RED = Fault with control

e. NFZ Ready

GREEN = Power on s

f. Zone Occupied

SOLID AMBER = Stop
 FLASHING AMBER = Slow

g. NFZ Fault

RED = System Faulted

h. Zone Bypassed

FLASHING RED = Bypass Key
 Switch Disabled

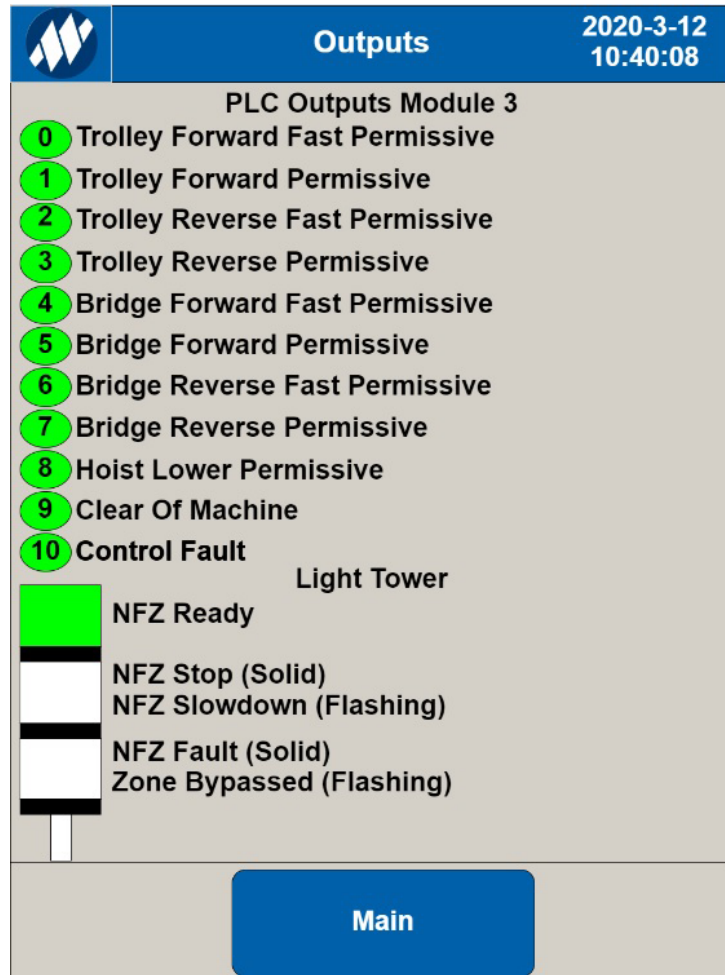


Figure 5-2: Intelli-Protect Outputs

6 Troubleshooting

6.1 Light Stack Indicators and Corrective Actions

Light Stack Fault Indicator	Fault Name / Description	Corrective Action
Solid Red light on Light Stack DANGER	Zone [number] Breached appears in Alarm List.	<ol style="list-style-type: none"> 1. Disable the No-Fly Zone using the key switch on the front of the enclosure 2. Manually move the crane out of the zone 3. Adjust zone dimensions, slow down distance, or stop distance 4. Enable the No-Fly Zone by turning key switch to Normal on front of the enclosure
Flashing or Solid Amber light on Light Stack WARNING	The hoist has entered the slowdown or stop region of a zone.	<ol style="list-style-type: none"> 1. Review the zone dimensions and adjust as needed for slow down and stop distances.
Flashing Red light on Light Stack	The NFZ system has been bypassed or no protection zones are enabled.	<ol style="list-style-type: none"> 1. The key switch on the front of the enclosure is set to bypass the No-Fly Zone protection 2. All zones have been disabled using the user interface

- **Green Light**

- A green light indicates power has been applied to the controller, and the system is in normal operating mode.

- **Amber Light**

- The amber light flashes when the slowdown limit switch is triggered, or the distance measured with the laser indicates the trolley or bridge motion has crossed into a slowdown area. The amber light changes to steady state if the stop area is entered.
- The amber light is turned off when in normal operation outside of a No-Fly Zone.

- **Red Light**

- The red light turns on when a fault occurs in the controller or laser, or when the protected zone is breached. The red light stays solid red until a breach or other fault is cleared. In this state all control is stopped until the fault has been cleared.
- The red light also flashes if no zones are configured such as on initial startup. In this state the red light will flash until at least one zone is enabled.
- The red light is turned off when in normal operation outside a No-Fly Zone, and when there is no fault with the lasers or controller.

6.2 Alarms and Corrective Actions During Operation

Example alarms on configurable systems:

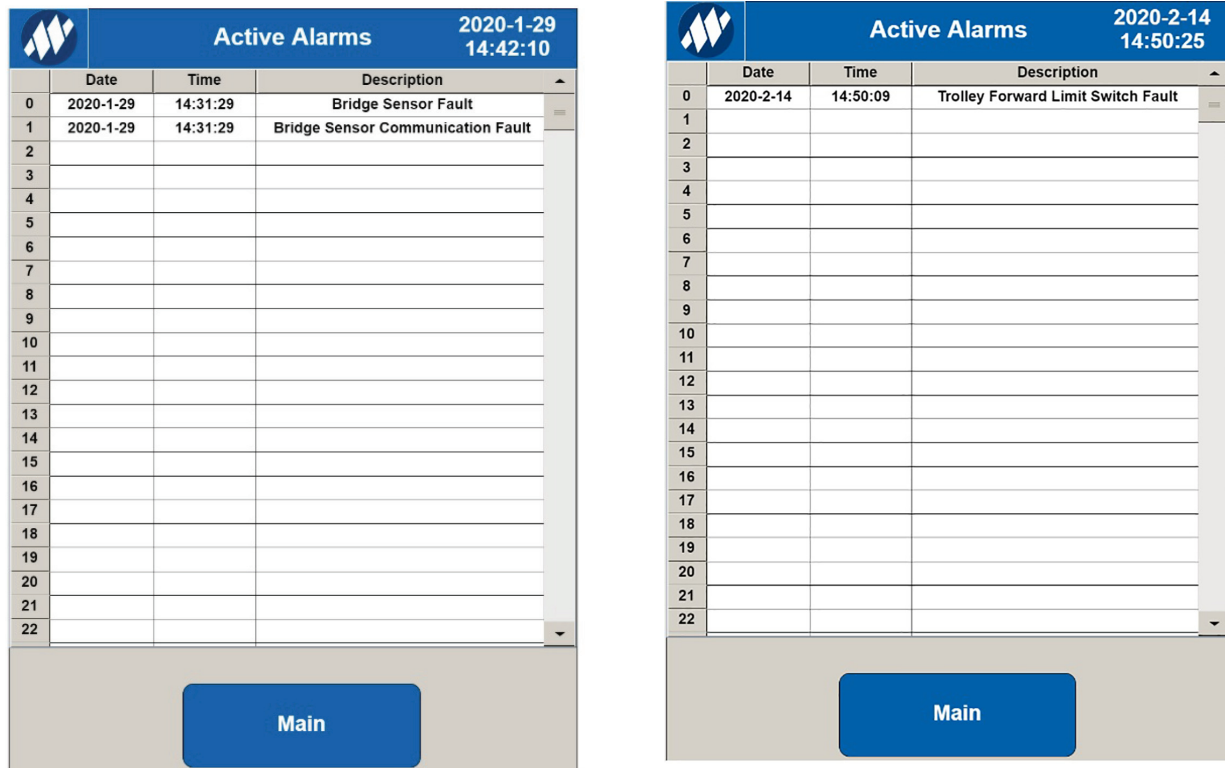


Figure 6-1: Alarm Examples

Alarm	Description	Corrective Action
Bridge Sensor Fault Trolley Sensor Fault	Sensor is not receiving a strong enough signal.	<ol style="list-style-type: none"> Clean the Bridge or Trolley laser lens with a lens tissue or cleaning cloth. Using a circular motion, gently remove oil, fingerprints, and grime from the lens surface. Clean the reflector surface to remove oil, fingerprints, and grime.
Bridge Sensor Communication Fault	Sensor is not receiving expected information.	<ol style="list-style-type: none"> Check the ethernet cable connection to the Bridge laser. Check the external components circuit breaker.
Trolley Sensor Communication Fault	Sensor is not receiving expected information.	<ol style="list-style-type: none"> Check the ethernet cable connection to the Trolley laser. Check the external components circuit breaker.

The Alarms screen button displays all currently active alarms.

7 Other Features

7.1 Horn/Zone Override

An optional Horn/Zone Override input is available on the Power and Control Wiring terminal block for all zones. Select the UI Zone Configuration checkbox “Hoist Upper Limit” to override the selected zone. This is available on each configurable zone.

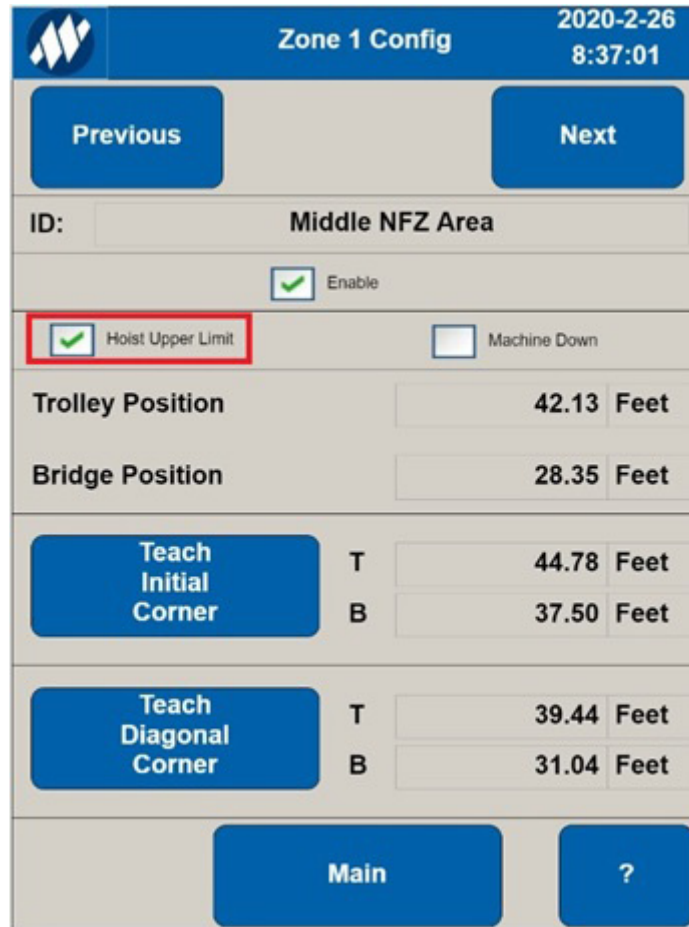


Figure 7-1: Hoist Upper Limit Switch

7.2 Machine Lowered Example

An optional Machine Lowered input is available on the Power and Control Wiring terminal block. The Machine Lowered input will allow the crane operator to fly over the top of a No-Fly Zone. This is available on Zone 1 only of the configurable No-Fly Zones.



Figure 7-2: Machine-Lowered Input

Wire the Machine Down contact to the Machine-Lowered input on (MACH) terminal located on the Power and Control Wiring terminal block if used.

8 Appendix

8.1 Wireless SSID Setup and Password

1. Using a web browser such as Internet Explorer, Chrome or Edge, type: 192.168.1.4 (default web server IP address).
2. Enter login id: magnetek, password: magnetek.
3. Select Wireless tab ->**Basic Settings** to change SSID.

The screenshot displays the Antaira Control Panel interface. At the top, the 'Wireless' tab is selected, and the 'Basic Settings' sub-tab is active. The main configuration area is titled 'Wireless Physical Interface ath0 [2.4 GHz]'. Below this, the 'Physical Interface ath0 - SSID [MagnetekNFZ] HWAddr [C4:93:00:0C:09:8B]' section contains several settings:

- Wireless Mode: AP
- Wireless Network Mode: Mixed
- Channel Width: Full (20 MHz)
- Wireless Channel: Auto
- Wireless Network Name (SSID): MagnetekNFZ (highlighted with a red box)
- Wireless SSID Broadcast: Enable Disable
- Advanced Settings:

Below the main settings is the 'Radio Time Restrictions' section with 'Radio Scheduling' set to Disable. At the bottom, there is an 'Add' button and a row of three buttons: 'Save', 'Apply Settings', and 'Cancel Changes'.

NOTE: After applying settings, press “Save” to ensure changes are saved in the event of power loss.

4. Select Wireless tab -> **Wireless Security** to change password.

The screenshot displays the Antaira Control Panel interface. At the top, the 'Wireless' tab is selected, and the 'Wireless Security' sub-tab is active. The configuration is for the physical interface 'ath0' with SSID 'MagnetekNFZ' and HWAddr 'C4:93:00:0C:09:8B'. The Security Mode is set to 'WPA'. Under 'Network Authentication', 'WPA2 Personal' is selected. Under 'WPA Algorithms', 'CCMP-128 (AES)' is selected. The 'WPA Shared Key' field contains the text 'MagnetekNFZ', and the 'Unmask' checkbox is checked. Other settings include a 'Key Renewal Interval' of 3600 seconds and 'Disable EAPOL Key Retries' set to 'Disable'. The 'Custom Config' field is empty. At the bottom, there are 'Save' and 'Apply Settings' buttons.

8.2 Wireless IP Address Changes

Select Setup tab -> **Basic Setup** to change local IP address.

The screenshot shows the Antaira Control Panel interface. At the top, the 'Setup' tab is selected, and the 'Basic Setup' sub-tab is active. The page is divided into several sections for configuration:

- WAN Setup:** Includes 'WAN Connection Type' (set to Disabled), 'Optional Settings' (Router Name: Antaira, Hostname, Domain Name, MTU: Auto/1500, Shortcut Forwarding Engine: Enable, STP: Disable), and 'Network Setup' (Router IP: 192.168.1.100, Subnet Mask: 255.255.255.0, Gateway: 0.0.0.0, Local DNS: 0.0.0.0).
- WAN Port:** 'Assign WAN Port to Switch' is unchecked.
- Network Address Server Settings (DHCP):** 'DHCP Type' is DHCP Server, 'DHCP Server' is Enable, 'Start IP Address' is 192.168.1.101, 'Maximum DHCP Users' is 50, 'Client Lease Expiration' is 1440 min, and 'Use DNSMasq for DNS', 'DHCP-Authoritative', and 'Forced DNS Redirection' are all checked.
- Time Settings:** 'NTP Client' is Enable, 'Time Zone' is America/Los_Angeles, and 'Manual assign' is 'Apply Browser's current date'.

At the bottom, there are three buttons: 'Save', 'Apply Settings', and 'Cancel Changes'. A help sidebar on the right provides details for 'Automatic Configuration - DHCP', 'Hostname', 'Domain Name', 'Local IP Address', 'Subnet Mask', 'DHCP Server', 'Start IP Address', 'Maximum DHCP Users', and 'Time Settings'.

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July 2021



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