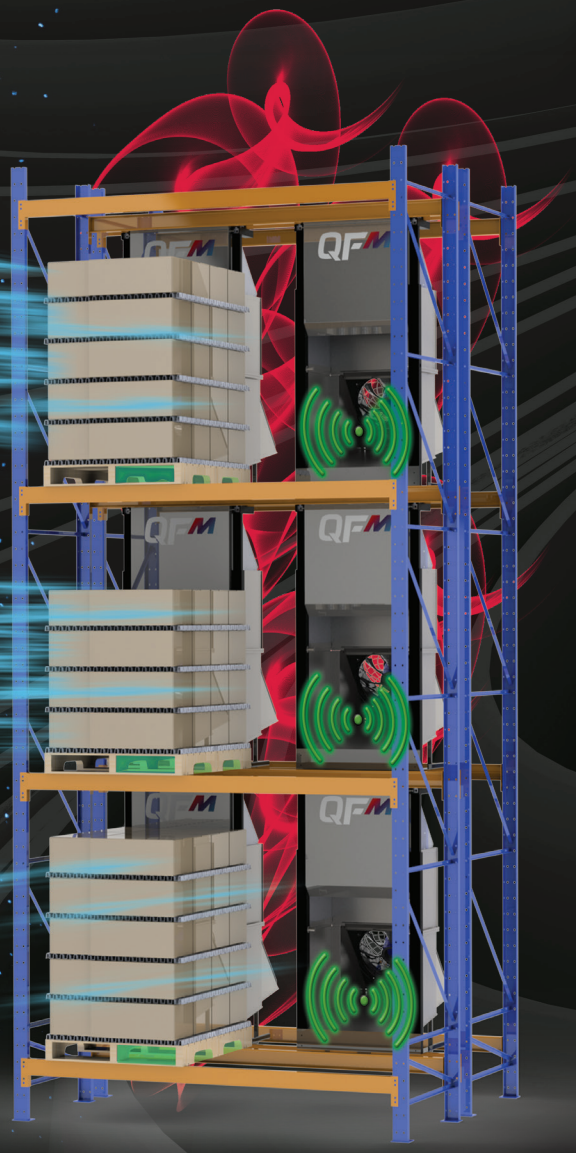
QFM

OPERATIONS MANUAL



QUICKFREEZE®

www.QuickFreeze.com

Read Manual Thoroughly

This manual should be read and understood before beginning the installation, operation or service of this equipment.

QuickFreeze reserves the right to modify electrical and equipment drawings in this manual as well as the parts used on this product are subject to manufacturing changes and may be different than illustrated in this manual. In some cases, separate prints may be included with your QFM Unit(s).

The information contained in this manual will allow you to operate and maintain the QFM in a manner which ensures trouble-free operation.

Your QuickFreeze representative provides the planned inspection and maintenance schedule which can be fitted to your specific operation. If any procedures for the installation, operation or maintenance of the QFM have been left out of this manual or are not complete please contact QuickFreeze by calling 260.234.2151 or by visiting www.QuickFreeze.com

QuickFreeze
6340 Innovation Blvd, Fort Wayne, IN 46818
www.QuickFreeze.com

> *For service related inquiries or general information, please call: 260-234-2151 or visit us at: www.QuickFreeze.com*

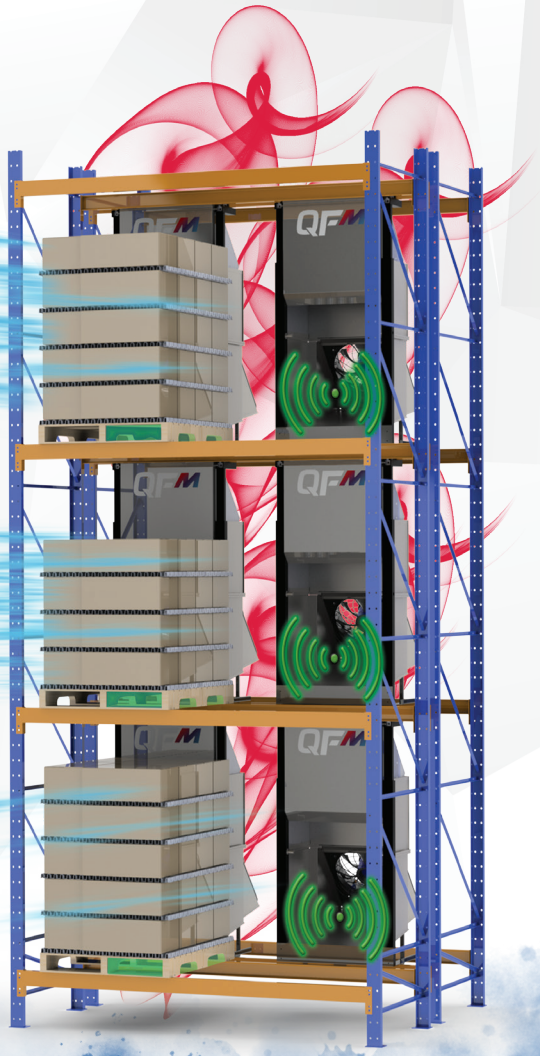
Table of Contents

Getting to Know your QFM

Congratulations on the purchase of your QuickFreeze QFM Unit(s). QFM is a modular, mobile unit that delivers the next evolution of QuickFreeze. Designed to work with your existing select racking, QFM will quickly increase your pallet freezing, cooling, or tempering capacity with minimal disruption to your operation.

Airflow is the most important factor in transferring heat. This proven principle is the basis of QuickFreeze. By moving air exclusively through the pallet, heat is moved as quickly as possible, providing speed, reliability and consistency.

- **Maximize Airflow**
  A dedicated fan and plenum rapidly moves air through the pallet
- **Modular**
  Users can install and remove QFM themselves. This allows equipment to be moved to other locations or stored off site for seasonal operations.
- **Faster**
  QFM works up to 80% faster than conventional blast & up to 40% faster than previous QuickFreeze Systems
- **Smarter**
  - **Occupancy Sensing**
    QFM starts when a pallet is placed in front of it and stops when the pallet is removed
  - **IoT**
    Data logging, remote control, Wi-Fi, JSON Communication
  - **Adjustable Dwell Time**
    Change the cycle time remotely through API or web interface
  - **AutoSense**
    Automatically senses when a pallet is finished



QuickFreeze Mobile Application

Download our mobile application to monitor your QuickFreeze Equipment

Available on the iPhone App Store

ANDROID APP ON Google play

QFM Caution Markings and Labels

Hazard of severe electrical shock. Disconnect power before servicing.

Keep hands, hair and clothing free and clear from fan blades.

Keep hands and feet clear of all pinch points in and around the machine.

Fan

Specification

- Electronically commutated (EC) motor with integrated controller
- Meets requirements for efficiency class IE5 (IEC60034-30-2)
- Voltage ranges ~380-480V 50/60Hz
- Integrated motor protection, active temperature management
- Interference emission EN 61000-6-3
- Interference immunity EN 61000-6-2
- High-efficiency energy-saving motor thanks to innovative motor technology
- The fan is manufactured with permanent low temperature ball bearing lubrication. No periodic maintenance recommended

IP 55 Protection

- Protection from dirt, dust, oil, and other non-corrosive material
- Protected against jetting water

(If your QFM serial number is before QFM-02398, then your fan is IP54. Protected against splashing water)

Electrical

- **General and Load**
  The QFM uses a 3 phase EC motor. See our Electrical Schematic on page 13 for more information.
- **"Daisy Chain" cabling**
  Cables consisting of one male and one female NEMA twist lock connectors are used to interlock QFM units horizontally. Male connectors attach to the power source side of the circuit. Females connect to the next unit.
- **Lockout/Tagout**
  The NEMA twist lock connectors facilitate easy unit removal at any position in a horizontal chain. The round prongs on the plug are fashioned with a hole for Lockout/Tagout.

Fig. II.C.2.1
Male and Female plugs locked together

Fig. II.C.2.2
Example of QFM Units daisy chained

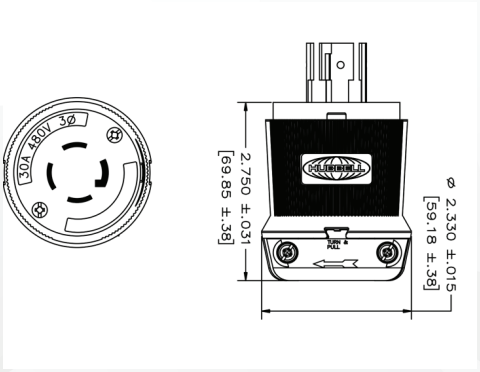


Fig. II.C.3.1
Male and Female NEMA twist lock connectors

Fig II.C.3.2
Lockout/Tagout example

Visual Inspection

Prior to unpacking and installing and/or moving your QFM's, the following visual inspections are recommended:

- **Frame Components**
  Visually inspect the frame and components to ensure they are not damaged. Make sure the retractable clamps and bolts are present for securing to the rack beam. Clamps should be fully retracted prior to installation.
- **Fan guards**
  Visually inspect each fan guard to ensure they are not bent, or damaged. The guards must be clean and damage free. The propeller must be able to spin freely without touching the guard.
- **Electrical Cables**
  Visually inspect the cables to ensure they are not damaged and all insulation is intact. Cables must have no exposed bare conductors and show no signs of overheating or burnt insulation near the male and female plugs.
- **Telescoping**
  Ensure smooth sliding of the telescoping plenum. The unit should adjust easily, without any section of the plenum getting stuck. Damage, such as dents or deformation of the sheet metal plenum, could hinder the unit's height adjustment.
- **Automatic Swing Seal**
  Ensure smooth articulation of the Automatic Swing Seal. Proper functioning of the Swing Seal is required for the most efficient processing of products.

Routine Inspections

Frequency: Weekly
Performed by: Operators

- Inspect the fan to ensure it is free of debris and obstructions.
- Verify that the swing seal moves freely and shows no signs of damage or excessive wear.

Physical Installation

Dimensions and Capacity

Measurement	Maximum Installed	Minimum Installed
Maximum Beam to Beam Height	**83"**	**55"**
Maximum Pallet Height	**77"** (Max Beam to Beam – 6" Lift)	**49"** (Max Beam to Beam – 6" Lift)
Minimum Pallet Height	**57"** (Max Pallet – 20" Swing Seal)	**29"** (Max Pallet – 20" Swing Seal)

Installation & Removal/Transferring

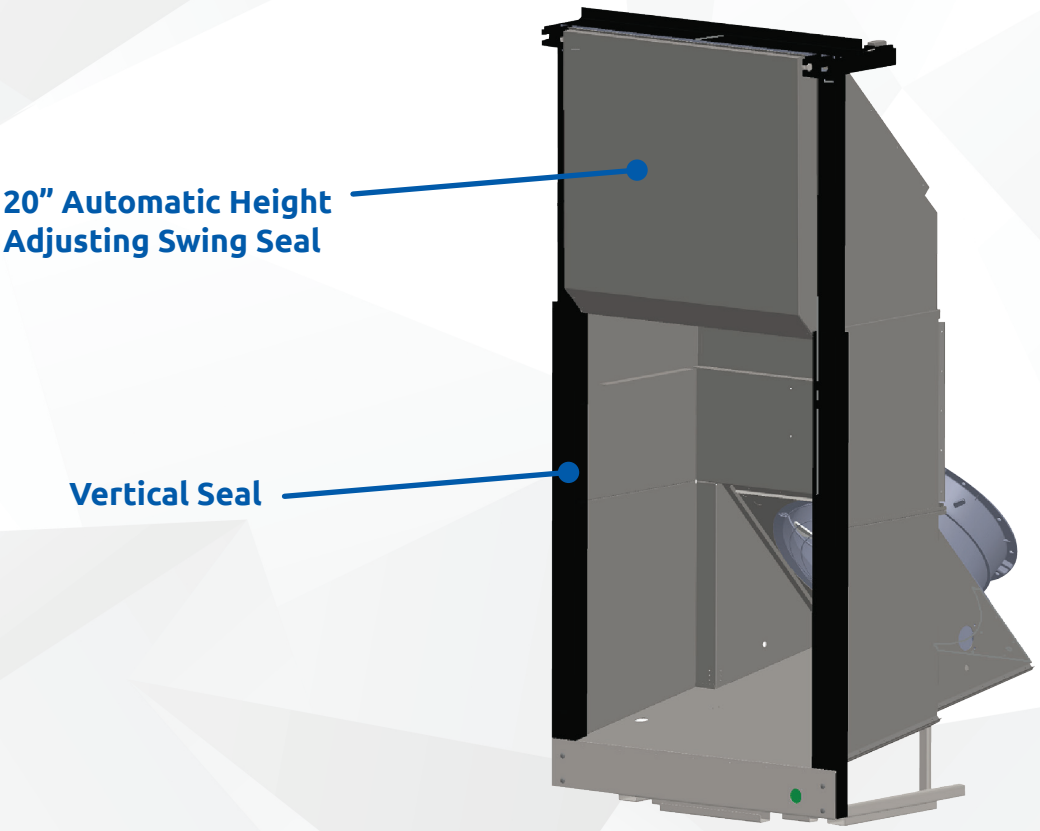
QFM Units are designed to be installed in existing racking. High quality structural steel racking is recommended. Each unit requires a structural beam above and below to fasten to for standard installation. Units may be fastened to the floor with ½" wedge anchors. See rack guidelines on page 18 for more details. If your racking doesn't conform, adapters may be required.

QFM uses patented technology to move air through each pallet allowing heat to move as quickly as the product allows for fast, consistent and predictable performance. Airflow will always take the path of least resistance. The QFM System operates by blocking all airflow paths except through the pallet, in between the spacers or through box holes.

Any other openings will inhibit the system's performance, so it is critical that the proper stacking and loading protocol is followed. Virtually any performance shortcomings can be attributed to improper and inconsistent pallet stacking and loading.

Components

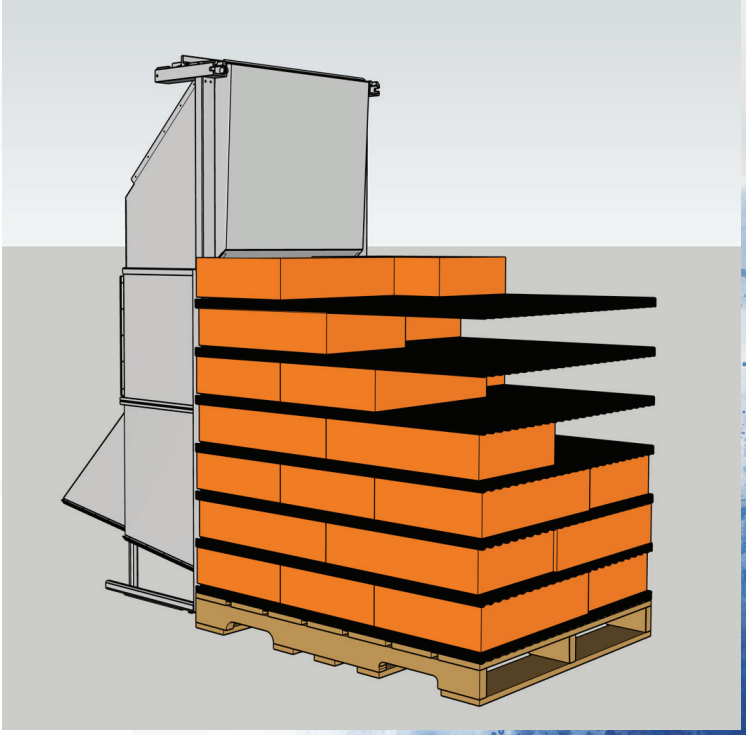
- **Swing Seal**
  Because of differing heights of product, a swing seal was incorporated into the QFM design. As the product is loaded into the position, the pallet pushes the swing seal into the plenum. Airflow above the product is successfully prevented by properly engaging the swing seal. The swing seal allows for 20" pallet height variability without any manual adjustment to the QFM unit or swing seal.
- **Vertical Seals**
  The vertical seals run vertically along each side of the swing seal. The loaded pallet needs to be pushed until the product is resting against both the right and left vertical seals. This ensures that there are no gaps for air around the sides of the pallet.



Product Stacking Requirements

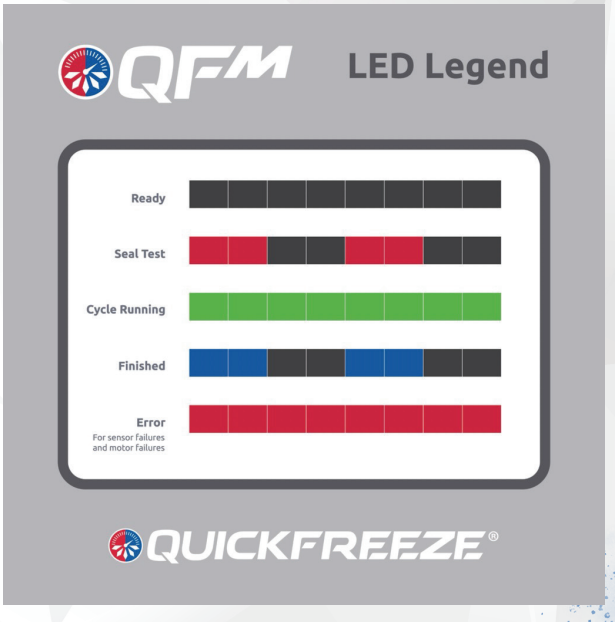
Properly stacking and spacing the product on the pallet is one of the most important aspects to ensure the QFM system operates to its full capacity.

- **Pallet Selection**
  Use high-quality, sturdy pallets that are not broken and able to carry the full weight of the product.
- **Product Placement**
  - The pallet needs to be stacked so that when it's loaded, the product cases are flush with the vertical seals from top to bottom.
  - Pallets that are leaning, tipping, or not flush to the seals create air gaps. Quality spacers should help minimize leaning and tipping.
- **Spacers**
  The product needs a minimum of 1" space and to be separated with good quality spacers that are not crushed, so that air can flow between the cases.
- **Obstruction Removal**:
  Shrink wrap needs to be removed so air can move through the pallet. Shrink wrap is not recommended. Use rubber bands.
- **Product Height Range:**
  - The swing seal allows for a 20" range from minimum product height to maximum product height.
  - As long as the top of the product engages BOTH the swing seal and vertical seals, the product is within the acceptable height range.
  - If the cases do not engage the swing seal, it's too short and needs to be loaded differently. (If a pallet is used in the middle of a stack, ensure the pallet is shrink wrapped so air doesn't move through it.)
  - If the pallet is loaded too high, it will engage the swing seal, but not the vertical seals. It will need to have the product removed until it engages the seals correctly.



Unit Startup and Operation Logic

Once the QFM is powered on, it automatically begins its startup and self-test process. During operation, the unit will display one of five main states:



1. Ready – In this state, the LED on the front of the unit is off, indicating that the QFM is ready to accept a pallet. **If the LED does NOT light up after placing the pallet, then it should not be used.*

2. Seal Test – When a pallet is placed in front of the QFM, the unit automatically performs a Seal Test to ensure the pallet is properly positioned and that no air gaps are present that could affect system performance. The unit will not start if the pallet is too far away or if debris is obstructing the LiDAR sensor.

If the seal quality rating falls below 100, a "Bad Seal" message will appear on the dashboard. After 5 minutes, the LED will turn green to indicate the unit is running, but the dashboard will continue to display "Bad Seal" for that location until the issue is corrected.

When the Seal Test Passes:

If the pallet is correctly positioned and no air gaps are detected, the Seal Test will pass. When this occurs:

- The LED light will turn solid green, indicating the unit has a good seal and is operating normally.
- No warnings or error messages will appear on the dashboard.
- The unit will proceed into its regular operating mode without interruption until it finishes the cycle.

3. Cycle Running – If the LED turns green before the 5-minute mark, this indicates a "Good Seal", and the unit will continue to run for its designated cycle time.

4. Finished – When either the timer expires or the pallet reaches its target temperature, the fan will automatically shut off and the LED will blink blue. This indicates the cycle is complete, and the operator may remove the pallet and place it in storage or its designated location.

5. Error – If a sensor or motor failure occurs, the LED will turn solid red. Do not place a pallet in front of the unit when this state is active.

6. Aux Flashes: –If an aux probe is plugged in, it will double flash red every 10 seconds, regardless of state. This is not an error.

Preventative Maintenance

Cleaning Chemicals

Some products will contaminate the QFM more than others and require occasional use of a cleaning chemical to remove. Verify any cleaning chemicals used are safe for stainless steel, aluminum and plastic, as chemicals that may work well with stainless steel will corrode the aluminum.

Washdown Rating of Fan and Control Box

The fan is IP 55 meaning it is protected from jetting water, however the control box is IP 54 meaning it is protected by splashing water. Both are protected from dirt, dust, oil, and other non-corrosive material.

Cleaning Instructions

1) Disconnect Power: Ensure all units are unplugged and power to the QFM's is turned OFF before beginning any cleaning procedures.

2) General Cleaning: Use a hose with clean water and a mild soap solution to wash down the units.

3) Pressure Washing Precautions: If using a pressure washer, avoid spraying directly as the control box and electrical plugs.

Reference Table of IP Rating Code

1st Digit	Symbol	Solid Object Protection	2nd Digit	Symbol	Water Protection
0		Not protected	0		Not protected
1		Protected against solid objects greater than 50mm	1		Protected against vertically dripping water
2		Protected against solid objects greater than 12.5mm	2		Protected against dripping water when tilted up to 15°
3		Protected against solid objects greater than 2.5mm	3		Protected against spraying water
4		Protected against solid objects greater than 1.0mm	4		Protected against splashing water
5		Protected from the amount of dust	5		Protected against jetting water
6		Dust tight	6		Protected against powerfully jetting water
IP 6 6 Code Letters — 1st Digit — 2nd Digit			7		Protected against temporary immersion in water
			8		Protected against continuous immersion in water

Recommended Spare Parts Inventory

Maintain the following spare parts on hand at a ratio of **one per 100 QFM units:**

QFM Fan Assembly — QFM-124
Control Box Assembly — QFM-132
Swing Seal Assembly — QFM-131

Visual & Audio Inspection

QFM Units are relatively quiet compared to other machinery in the environment. A noisy QFM, usually means some debris, packaging or labeling has entered the fan guard and is contacting the spinning fan blades. Visually inspect the inside of any noisy QFM unit for foreign objects.

Troubleshooting

Symptom	Procedure
Unusually noisy QFM Unit	Disconnect power Inspect the return and fan guard for obstructions
Motor error	Disconnect power Inspect the return and fan guard for obstructions Reconnect power
Product not processing at uniform rate or completely	Verify stacking Inspect spacers Verify free movement of swing seal Verify good seal quality on Dashboard
Poor Seal Quality	Pull pallet back 36” and replace after 15-30 seconds Review product placement Review rack height to product height Verify free movement of swing seal
Unit will not boot up	Verify electrical connections Verify power at source Visually inspect Unit Wiring for damage
Unit not telescoping completely or smoothly	Check QFM-079 set screws (If too tight the system will not telescope)
Fan Comm Error	Disconnect power Check all cables to ensure they are damage free and inserted correctly Reconnect power
Fan won’t start	Inspect the control box and ensure there isn’t debris in the plenum

NOTE: If you have any symptoms or issues not covered in this troubleshooting section or you are unable to troubleshoot, please contact support@quickfreeze.com as most issues can be resolved remotely.

QFM ELECTRICAL WORK DESCRIPTION NOTES

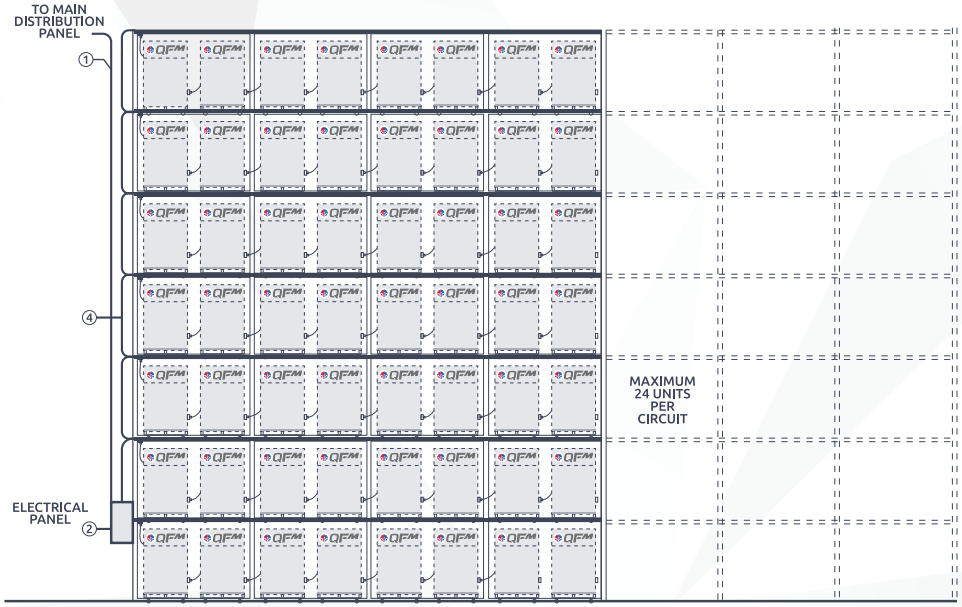
1) PROVIDE 480V,3ø,60HZ FEED TO NEW ELECTRICAL PANEL FOR QFM.

2) PROVIDE 480V, 3ø,4W MAIN-LUG-ONLY PANELBOARD.

3) PROVIDE (1) 3/30A BREAKER PER QFM ROW (MAX 24 UNITS PER 30A BREAKER).

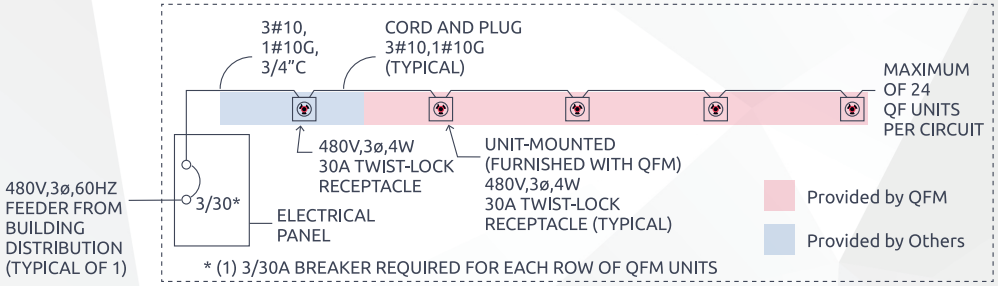
4) PROVIDE 480V, 3ø,4W 30A TWIST-LOCK RECEPTACLE IN 4-SQUARE ELECTRICAL BACKBOX. DEDICATED GROUND REQUIRED PER RECEPTACLE. TYPICAL OF 1 PER ROW. MOUNTED TO RACKING UPRIGHT. (HUBBELL HBL2730 RECOMMENDED).

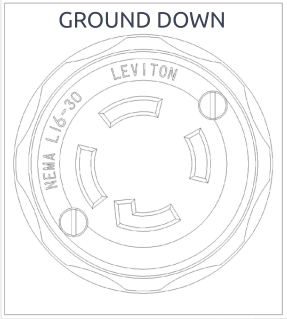
5) PROVIDE CONDUIT BETWEEN PANEL AND RECEPTACLE FOR CIRCUIT. REFER TO WIRING DIAGRAM FOR CONDUCTOR SIZE. ALL VERTICAL CONDUITS SHALL HAVE CONDUCTOR STRAIN RELIEF (TYPICAL ONE VERTICAL CONDUIT PER ROW).



TYPICAL QFM ROW WIRING DIAGRAM

NOT TO SCALE





09/13/24

Tippmann Engineering
6340 Innovation Blvd,
Fort Wayne, IN 46818
www.QuickFreeze.com
MKT-354.2 - 04.30.24

WiFi Communication

The QFMs require an IP address per unit. They are DHCP, and only communicate 2.4 GHz so make sure to turn off band steering if that is an option.

Network Setup Workflow

1. Temporary Configuration Network – Set up a temporary WiFi network with the SSID QF_Config and password 12!@34#$56%^78&*90() Ensure that the network associated with QF_Config has access to https://qfmonitoring.com, which uses SSL traffic.

2. Change the SSID and Password – Users can update the SSID and password the QFMs connect to through the dashboard. In the "Email Support" widget, click the three dots in the upper-right corner and enter the new stationssid and stationpassword. Updates may take up to 30 minutes. Confirm the QFMs have received the new settings by checking the wifiAP column in the widget below.

3. Receive New Instructions – Once the QFMs connect through QF_Config, they will automatically receive the new SSID and password information. This process takes approximately 30 minutes.

4. Switch to Permanent Network – After all QFMs have received their configuration, disable the QF_Config network. The QFMs will then connect to the permanent SSID you provided.

5. Verify Connection Status – When all units are online, check the "Disconnected" section of the dashboard to identify any QFM that is not communicating properly.

Common Reasons a QFM May Be Offline

Incorrect SSID or Password – Network names and passwords are case-sensitive. For example, if your network name is Network and the QFM received network, it will fail to connect.

5 GHz Network Interference – QFMs operate only on 2.4 GHz. If 5 GHz is active, the units will not connect.

Poor Signal Strength – If multiple QFMs in an area are offline, the signal may be weak. Ensure there are sufficient access points for full coverage.

Power Connection Issues – Verify that all power cables and connections to the control boxes are securely seated and that LED indicators are functioning properly.

Insufficient IP Addresses – Each QFM requires a unique IP address. If the DHCP pool is exhausted, new units will fail to connect.

DHCP Lease Timeout – If the lease period for an assigned IP expires, the QFM will disconnect until a new address is issued.

Network Blocking Traffic – The QFMs communicate only with https://qfmonitoring.com. If outbound SSL traffic to this address is blocked, the units will appear offline.

Network Configuration Issues – Network settings vary depending on infrastructure. If you've followed these steps and still experience issues, contact support@quickfreeze.com for assistance.

If you are not confident with IT configuration or network troubleshooting, please contact support@quickfreeze.com to ensure all QFMs are properly connected and communicating.

Internet Security Standards and Network Requirements

QuickFreeze QFM Internet Security Standards and Network Requirements

QFM is an IOT Device and is intended to have constant connectivity to be used to its full potential.

Each QFM unit (one per pallet location) is Wi-Fi ready and is capable of sending and receiving data to/from your facility's Wi-Fi AP (Access Point), then to the internet to communicate with https://qfmonitoring.com. Please make sure this site is whitelisted in your firewall.

WiFi Network Info

Band: 2.4 GHz, 802.11 b/g/n
Encryption: WPA2-PSK
DHCP assigned network addresses are required as each unit will need an IP address*

Traffic Bandwidth

Each unit sends a data payload of approximately 1000 bytes to the server every 5 minutes, and requests settings from the server (payload of about 1000 bytes) every 15 minutes. When not sending data or getting settings no bandwidth is used.

Pre-configuring

We require the network SSID and password so that the units can be shipped pre-configured, ready to connect to your network.

Network IP Addresses

Your network will need to have available IP addresses for each unit.

Security

QFM does not need any local network access, only access to https://qfmonitoring.com/

Default Wi-Fi Connection

Every QFM comes from the factory ready to connect to the following SSID:
SSID: QF_Config
Password: 12!@34#$56%^78&*90()
This can be used when changing your internal network settings, or for initial Wi-Fi Setup.
Band: 2.4 GHz, 802.11 b/g/n
Encryption: WPA2-PSK

**MAC addresses for each unit can be provided upon request to allow for provisioning on your network.*

QFM System Dashboard

The QFM System includes access to a dashboard that allows operators to monitor and control their equipment in real time. Data is transmitted securely to an Amazon Web Services (AWS) host and can be accessed via the following URL: https://qfmonitoring.com. To request access to QFMonitoring, email support@quickfreeze.com.

In addition to the web-based dashboard, operators can also access system data through the QuickFreeze mobile application, available on both iOS and Google Play Store.

Dashboard Overview

The dashboard provides a comprehensive view of system status and QFM performance. From this interface, users can:

- **View System Utilization**
- **QFM status indicators:**

  Ready – QFM is available and waiting for a cycle.

  Running – QFM is actively operating.

  Bad Seal – QFM detected poor seal quality between the pallet and the QFM.

  Complete – QFM has finished its cycle.

  Error – QFM has triggered an alarm condition.

  Disconnected – QFM is not currently communicating.
- **Monitor System Alarms**

  Active alarms (e.g., motor block, fan communication error, etc.) are displayed in the Alarms section.

  When an alarm occurs, the dashboard will log it as an Error and send a push notification directly to the operator's mobile device.
- **Track Temperatures**

  Selecting an individual QFM will display a detailed temperature graph.

  Graphs show real-time and historical unit temperatures for monitoring and troubleshooting.
- **Manage QFM Cycle Time**

  Operators can control the runtime of the entire system.

  Runtime can also be set for individual devices independently.
- **Review Device Details**
  - **Air Temperature**
  - **Seal Quality Pressure**
  - **Remaining Cycle Time**
  - **Elapsed Time**

QuickFreeze Mobile Application

The QuickFreeze mobile app provides the same monitoring and alert capabilities as the web dashboard. Operators can:

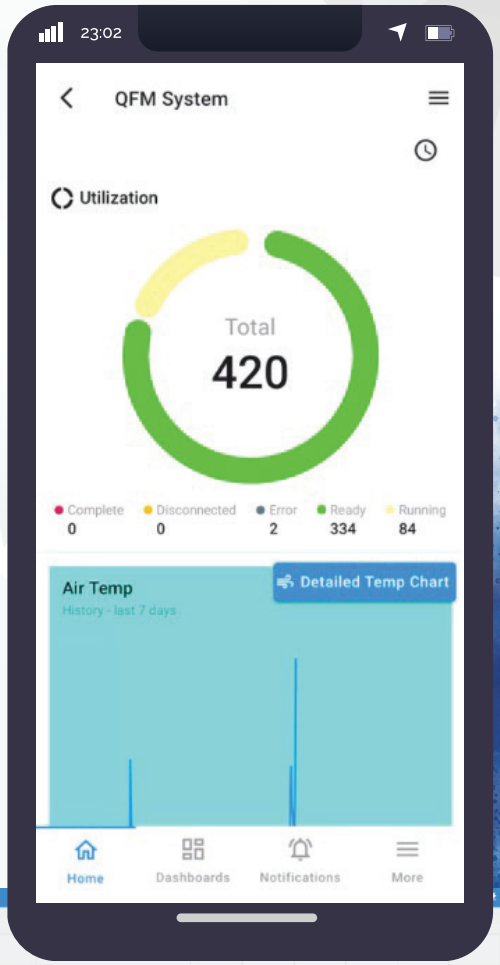
- **Receive push notifications of alarms in real time.**
- **Check device status and temperatures remotely.**
- **Adjust runtime settings directly from their mobile device.**

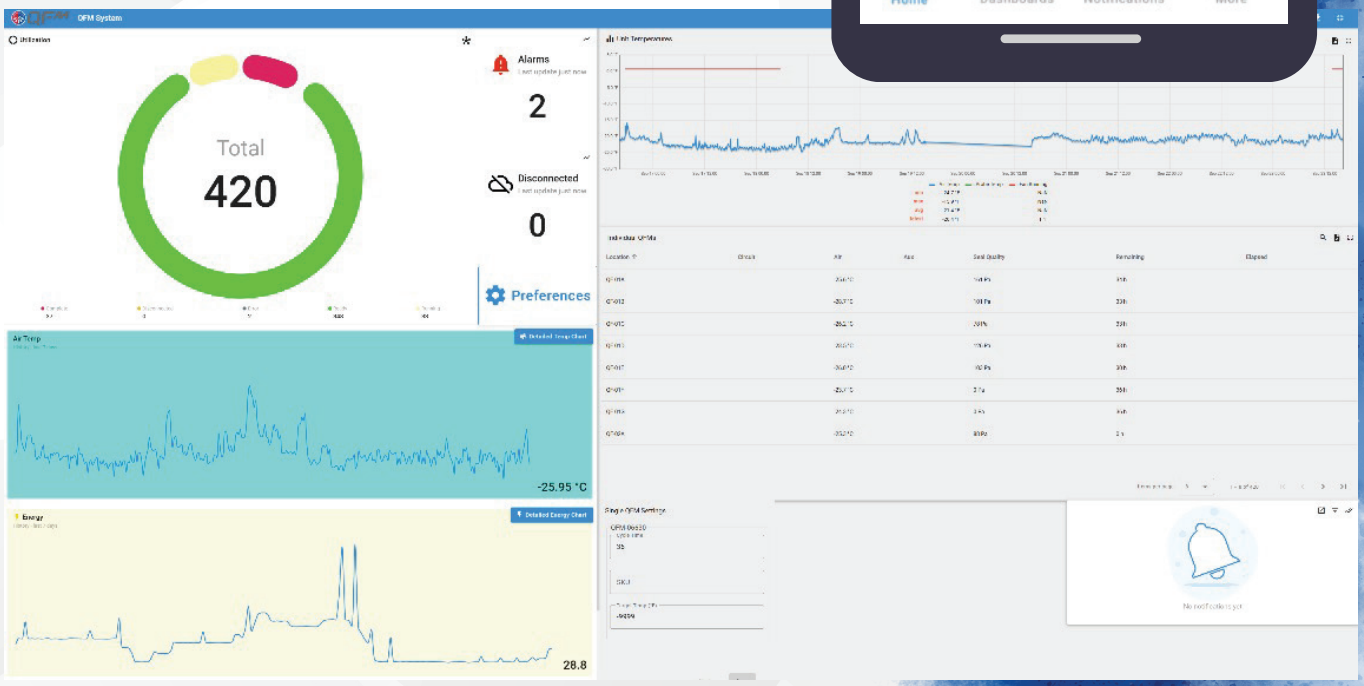
The app is available for download on:

- **Apple App Store (iOS)**
- **Google Play Store (Android)**

Available on the iPhone App Store

ANDROID APP ON Google play





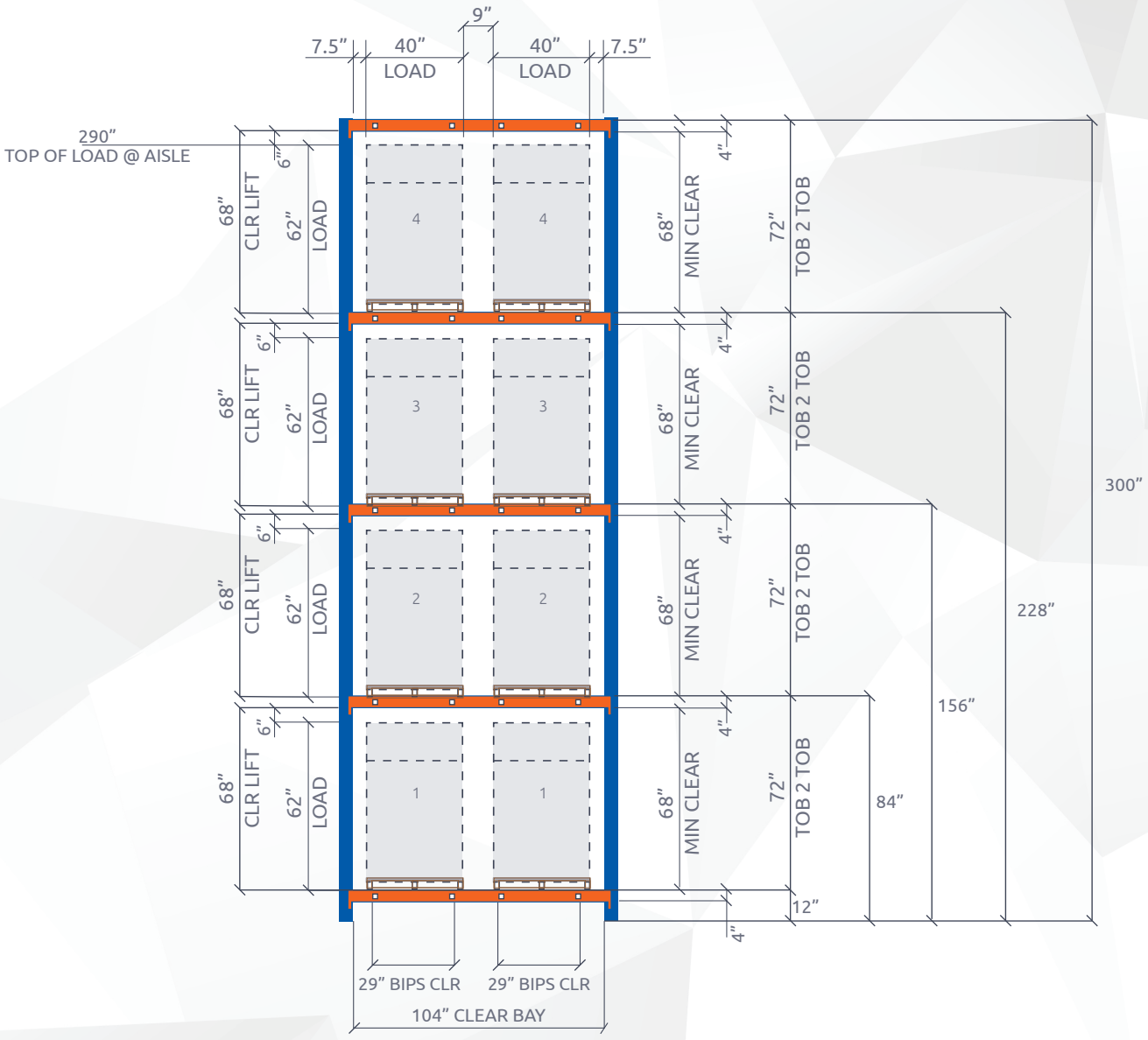
Normal Component Operating Specifications

QFM Racking Guidelines

Included below are the minimum and recommended specifications for racking. QFM rack positions see more turns and traffic than normal storage positions. Please follow the recommended specifications.

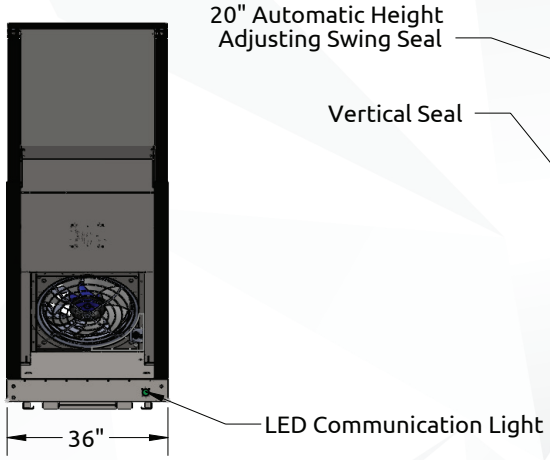
	Minimum Requirements	Recommended Specifications
Overall Design		
	2,000 lb. Capacity	2,500 lb. Capacity
	2 deep with Structural Beams	Structural "Select Rack" (2 deep)
	1 High	1–7 High
Uprights		
Material	Steel	Structural Steel
Depth	Rear 36" / Front 42"	Both 42"
Width	N/A	4" (C4 Channel)
Reinforcement	N/A	Aisle Side Double Boxed Channel 96" from Floor
Floor Level Protection	N/A	Welded Bullnose Deflector at Floor Level
Height Adjustability	N/A	1" Vertical Adjustability
Upright to Upright Distance	9"	9"
Color	N/A	Color–Standard Blue (0000FF)
Beams		
Clear Bay (Distance between uprights)	96"	104"
Material	Use 3" structural beams (C3 channel) if no QFM is above; otherwise use 4" beams	4" Structural Beams (C4 Channel)
Top Beam	Beam Above Top Level QFM Required	Beam Above Top Level QFM Required
Bottom Beam	Must be wedge-anchored to the floor, attached to a bottom beam below the lowest QFM, or use an adapter	Must be wedge-anchored to the floor, attached to a bottom beam below the lowest QFM, or use an adapter
Opening Height Minimum	55" (Minimum Beam to Beam Height)	55" (Minimum Beam to Beam Height)
Opening Height Maximum (Sized 6" Taller than Pallet Height)	• No maximum beam to beam height limitation as we offer plenum extensions which allow you to install to any height of beam. • Standard equipment ships with max opening of 83" • Extension pricing can be quoted per your specifications	• No maximum beam to beam height limitation as we offer plenum extensions which allow you to install to any height of beam. • Standard equipment ships with max opening of 83" • Extension pricing can be quoted per your specifications
Pallet Support Spacing (BIPS Required)	29" between supports	29" between supports

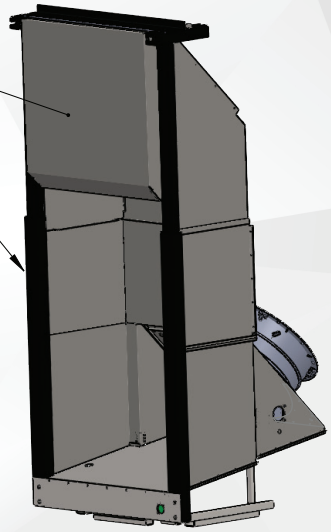
Sample Views of Racking Recommendations

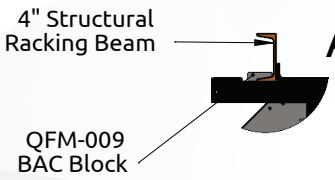


Sample Views of Racking Recommendations

QFM Specifications Sheet



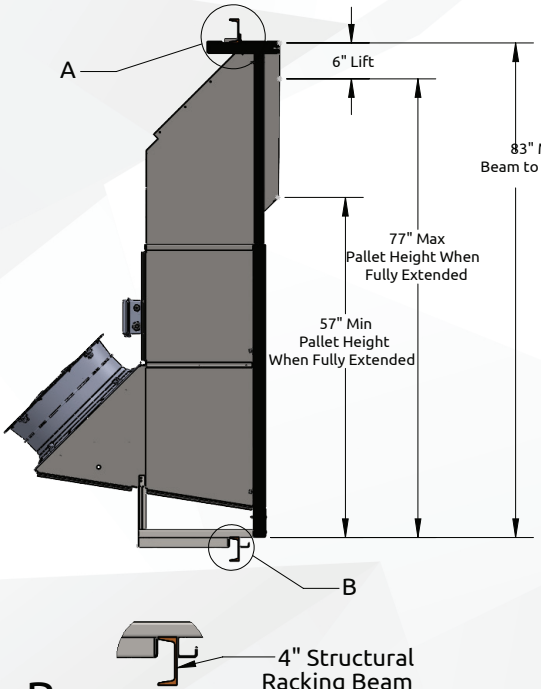


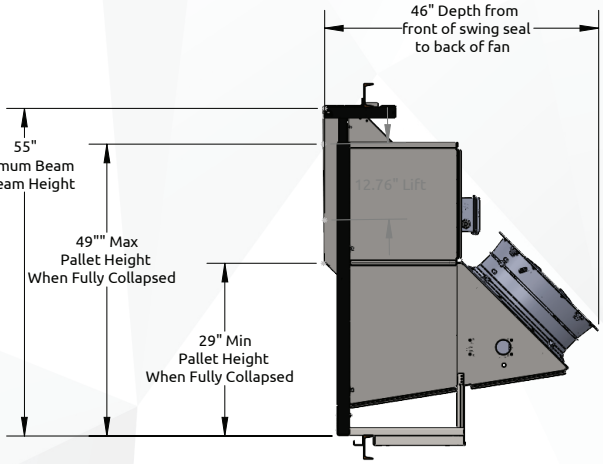


A. Beam Attachment Clamp Detail

***Plenum Extensions:**

The QFM has NO maximum beam to beam height limitation as we offer plenum extensions which allow installation to any height of beam to accomodate any height of pallet



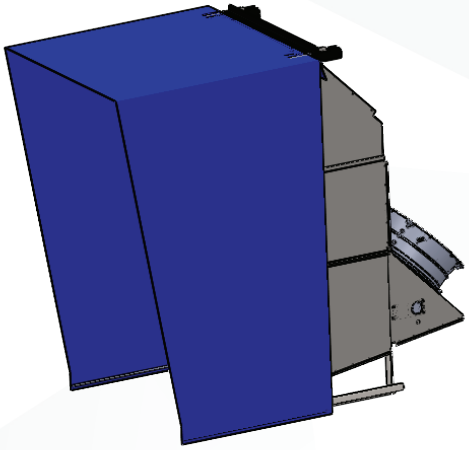


B. Bottom Beam Attachment Detail

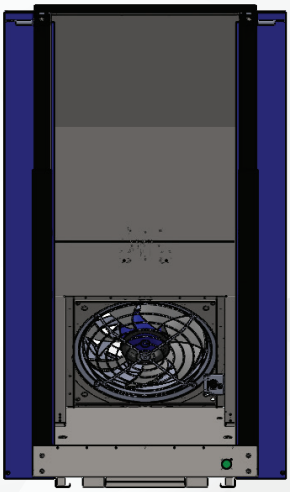
HS Codes for Import/Export Shipping	
QFM	8414.60.0000
QFM Fan Only	8414.59.6590
QFM Control Box	8414.90.1080
QFM Install Tool	8482.90.0390

QFM with AutoSeal Specifications Sheet

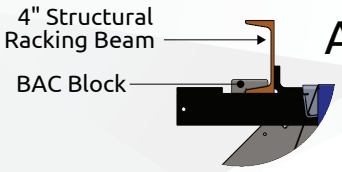
AUTO SEAL



Auto Seal (Shown in Blue) By QuickFreeze
A Perfect Seal on Every Pallet



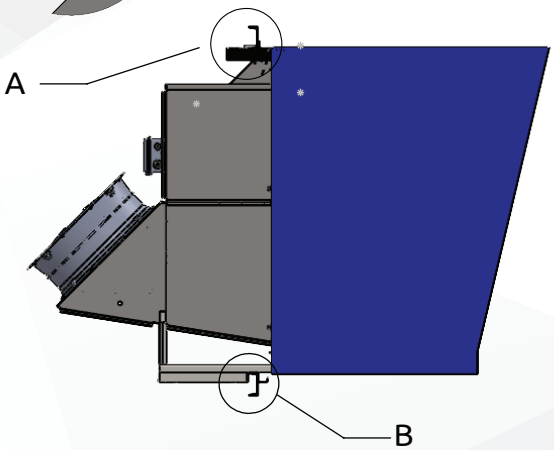
Pallet Opening Width

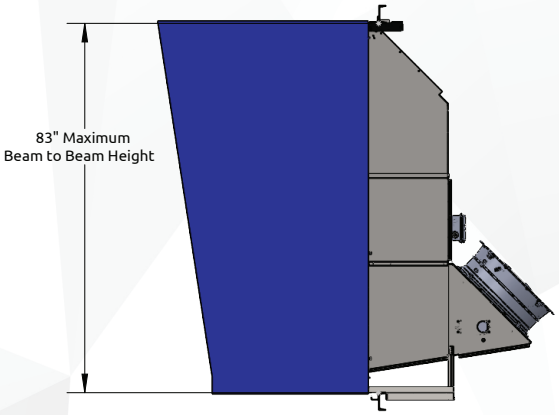


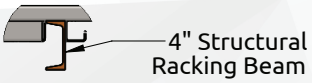
A. Beam Attachment
Clamp Detail

***Plenum Extensions:**

The QFM has NO maximum beam to beam height limitation as we offer plenum extensions which allow installation to any height of beam to accomodate any height of pallet





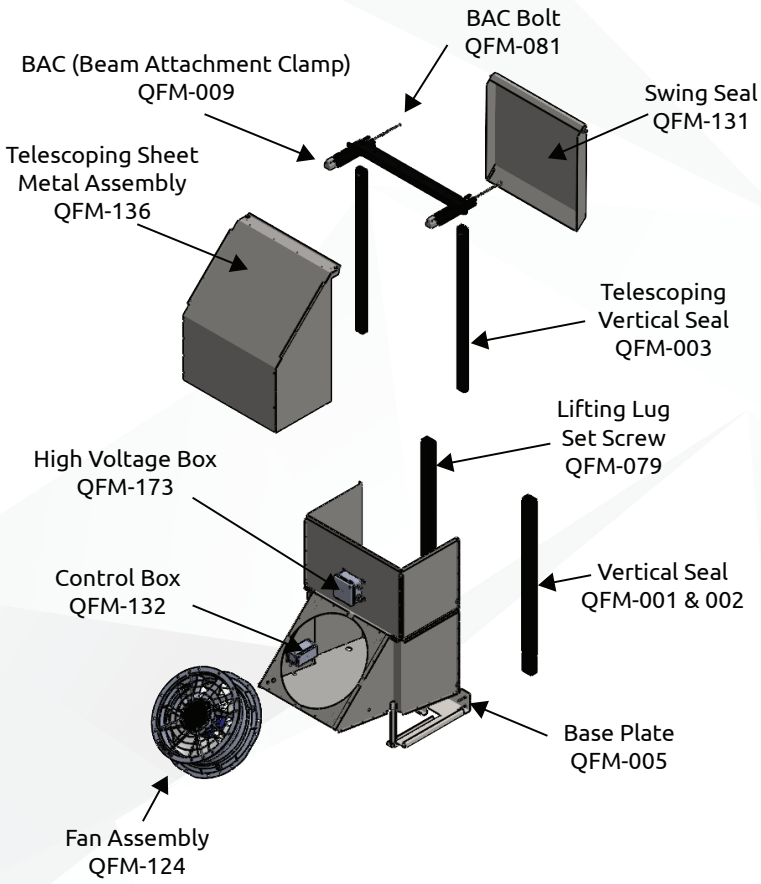


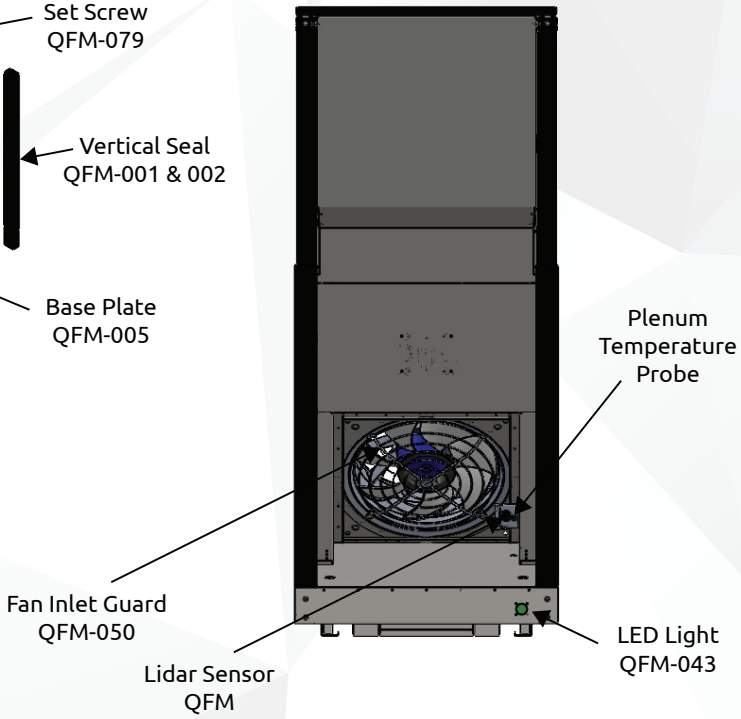
B. Bottom Beam
Attachment Detail

HS Codes for Import/Export Shipping	
QFM	8414.60.0000
QFM Fan Only	8414.59.6590
QFM Control Box	8414.90.1080
QFM Install Tool	8482.90.0390

QUICKFREEZE

Exploded View – Parts List





QFM

QUICKFREEZE®

MADE IN USA

QuickFreeze • 6340 Innovation Blvd, Fort Wayne, IN 46818 • www.QuickFreeze.com