MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

B Series | Box Lift

Owner's, Installation, and Maintenance Manual

Important:

Read this entire manual. Important safety information is included.

Before starting the installation, verify the job site dimensions and the dimensions of the delivered materials against the PFlow Industries, Inc. General Arrangement (GA) drawing.

The illustrations depicted in this manual are not to scale or detail. The illustrations are for reference only.

Refer to Your Job Specific Manual

15719-0001 | Rev L | 2025-04-01 | Printed in the U.S.A.

Table of Contents

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Table of Contents

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Table of Contents

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Table of Contents

MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Table of Contents

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

PFlow Industries, Inc.
6720 N. Teutonia Avenue
Milwaukee, Wisconsin 53209

Office
Phone: 414-352-9000
Fax: 414-352-9002

Customer Support Department
e-mail: csd@pflow.com

Sales
e-mail: sales@pflow.com

For a list of contact personnel visit the PFlow Industries, Inc. website at:
https://www.pflow.com/contact

Documentation

PFlow Industries, Inc. reserves the right to make changes or improvements to the standard model line at any time. PFlow Industries, Inc. reserves the right to make changes to subsequent editions of the manual without prior notice to holders of this edition.

Copyright Notice

© Copyright April 2025 by PFlow Industries, Inc.

All rights reserved.

No part of this manual may be reproduced or used in any form without expressed written permission from PFlow Industries, Inc.

This publication may be photocopied by the original purchaser. Any other type of reproduction is prohibited without express written permission from PFlow Industries, Inc.

Trademarks

All trademarks referenced in this manual are the property of their respective owners.

System Modifications/ Disclaimer

Mechanical or electrical modifications performed on the equipment not approved by PFlow Industries, Inc. may void any warranty and/or service agreements. Please contact the PFlow Customer Support Department for assistance with service modifications.

Training

Training is available upon request from the Customer Support Department. Half-Day, Full-Day, and Two-Day sessions are customized to fit specific needs - either for a single equipment type or for the entire product line.

On-site Supervision

On-site supervision services are available from the Field Service Department. Contact our Field Service Manager for more details.

Source Language

This manual is written in American English.

MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Introduction

This manual provides information about the PFlow Industries, Inc. custom designed Vertical Reciprocating Conveyor (VRC). As the nations' leading manufacturer of vertical material handling equipment, PFlow Industries, Inc. is confident that this new VRC will provide many years of reliable service.

General Overview

The VRC provides a safe and simple means of moving material from one level to another. The simplicity of design and few moving components ensure a trouble-free, long life, with low maintenance and little downtime.

Code Requirements

This VRC is designed for the movement of materials only, up to the VRC's rated capacity, from one level to the next. Do not allow anyone to ride on the VRC. VRCs are **not** elevators, and are specifically excluded within the scope of the ASME A17.1 Safety Code for Elevators and Escalators. VRCs are included in ASME B20.1 Safety Standard for Conveyors and Related Equipment, which is incorporated by reference into OSHA 29 CFR 1910. A copy of the ASME B20.1 standard can be purchased at www.asme.org and other sources. PFlow Industries, Inc. recommends that this standard be referenced for appropriate installation, maintenance, inspection, and operation in relation to hazards. All electrical designs and components are in accordance with National Electric Code (NEC) requirements. Local codes may require initial inspection of the installation and periodic inspection and testing of the unit. Contact PFlow Industries, Inc. for more information in the event an inspection is required.

NOTE

The information and illustrations in this manual are intended only as an aid to understanding the VRCs general installation. The information and illustrations do not cover every possible contingency or circumstance regarding nonstandard options or site conditions.

If there is a problem, call PFlow Industries, Inc. at (414) 352-9000, during normal business hours, 8:30 a.m. to 5:00 p.m. central standard time, Monday through Friday. Outside of those hours, see the PFlow Industries, Inc. Contact Information page for additional information. Use the model number and serial number or the PFlow Industries, Inc. General Arrangement (GA) drawing number for the lift in all correspondence.

Parts

Equipment damage resulting from modification in any manner from the original model, including the substitution of parts other than factory authorized parts, will void the warranty. Furthermore, PFlow Industries, Inc. will not be liable for any loss, injury, or damage to persons or property, nor for direct, indirect, or consequential damage of any kind resulting from modified or substitution of parts other than factory authorized parts of said material or equipment.

PFlow Industries, Inc. maintains a complete stock of, or has access to, all replacement components. Detailed records of all equipment sold are kept. If a component is damaged in shipment, is defective or missing, contact PFlow Industries immediately.

Service

The PFlow Industries, Inc. Customer Support Department will assist maintenance and service personnel with any questions or problems regarding the equipment or installation.

Feedback

Your feedback is important. Please help PFlow Industries, Inc. understand if the equipment has met your expectations. Please complete the questionnaire in this manual. The questionnaire will help us address any comments and/or concerns.

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Parts and Labor

Parts:		Labor:	
Structure	Lifetime	Structure	Lifetime
Manufactured Components	1 Year	Manufactured Components	1 Year
Purchased Components	1 Year	Purchased Components	Supplier
Gates and Enclosures	90 Days	Gates and Enclosures	90 Days

Definitions

- Structure is defined as columns, carriage, and pre-fabricated bracing (excluding carriage side guards).
- Manufactured components are defined as those components manufactured by PFlow Industries, Inc.
- Purchased components are those components that are used as supplied by vendors and covered by the Supplier's labor warranty.

Warranty

PFlow Industries, Inc. expressly warrants to the original purchaser that this product will be free from defects in material and workmanship under normal, intended use. The warranty period begins 60 days after shipment.

Exclusions

This warranty does not apply to:

1. Equipment or components damaged or broken in transit or shipping.
2. Replacement of wear parts.
3. Equipment failures caused by abuse, misuse, exceeding recommended capacities, impact with other objects, negligence, improper installation, unskilled use, unskilled maintenance, inadequate maintenance, or incorrect adjustments.
4. Exposure to a corrosive or abrasive environment or exterior elements unless specifically built for that environment.
5. Equipment that has been repaired, altered or modified in any manner outside of the manufacturing facility, substitution of parts other than factory authorized parts, removal of any parts, or addition of any parts without prior written permission by PFlow Industries, Inc.
6. Any losses or damages resulting from loss of data, loss of revenue or profits, loss of products, incidental or consequential damages, delays, or expenses incurred by failure of said part or parts even if advised of the possibility thereof.
7. Lost time and/or additional trips for missing or damaged components.
8. Expedited freight charges.

Obligation

The obligation for PFlow Industries, Inc. is limited to only the replacement or repair of defective components that received prior authorization. This is the owner's sole remedy.

PFlow Industries, Inc. will bear normal labor charges performed by an authorized PFlow Industries, Inc. service agent during standard business hours, excluding overtime, holiday rates, or any additional fees.

This warranty applies to all models and no person except an officer of PFlow Industries, Inc. is authorized to modify this warranty or to incur on behalf of PFlow Industries, Inc. any other obligation or liability in connection with PFlow Industries, Inc. equipment.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Liability

PFlow Industries, Inc. believes, to the best of our knowledge, that the information in the equipment manuals are accurate. In the event that technical or typographical errors exist, PFlow Industries, Inc. reserves the right to make changes to subsequent editions of the manual without prior notice to holders of this edition. The reader should consult PFlow Industries, Inc. if errors are suspected.

The customer's right to recover damages caused by fault or negligence on the part of PFlow Industries, Inc. shall be limited to the amount paid to PFlow Industries, Inc. by the customer. The limitation of liability of PFlow Industries, Inc. will apply regardless of the form of action, whether in contract or tort, including negligence. Any action against PFlow Industries, Inc. must be brought within one (1) year after that cause of action accrues.

PFlow Industries, Inc. will not be liable for any loss, injury, or damage to persons or property, nor for direct, indirect, or consequential damage of any kind resulting from failure or defective operation of said material or equipment.

Warranty Procedures

All billing must be in accordance with our Warranty Procedures. Replacement of defective parts will be handled in accordance with the Return Materials Authorization (RMA) policy for PFlow Industries, Inc.

Pre-Authorization

- All warranty work must be pre-authorized by PFlow Industries, Inc. Customer Support Department prior to starting work.
- Where distance and or experience may be more cost-effective, PFlow Industries, Inc. reserves the right to use alternate organizations.
- Labor is defined as a maximum of two hours travel per call, plus reasonable on-site repair time as determined by PFlow Industries, Inc.
- Local purchase of components must be pre-authorized.

1. Notify the PFlow Industries, Inc. Customer Support Department of the problem for authorization.
2. PFlow Industries, Inc. will determine:
   - The cause of the problem.
   - Who will do the repair work.
   - The repair details involved.
3. If PFlow Industries, Inc. decides that your organization or your subcontractor will do the work, an authorization number will be assigned which must be referenced on all subsequent paperwork.

NOTE *Notify PFlow Industries, Inc. by phone, FAX, or e-mail during the next business day if an event occurs during our non-working hours. Issuance of an authorization number does not guarantee approval and/or payment.*

Invoices

1. Submit an invoice for approval within 30 days after the date the work was completed. Payment is made 30 days after the date of approval.
2. A deduction from outstanding payments to PFlow Industries, Inc. for warranty is never authorized.
3. Invoices received without sufficient information will be returned. Invoices will be reconsidered for approval when complete documentation is received. All invoices must include, in detail, the following:

☐ PFlow serial number.	☐ Labor hours expended resolving the problem.
☐ Date the work was performed.	☐ Rates per hour.
☐ Description of the problem.	☐ Copies of receipts for materials purchased.
☐ Travel time incurred.	☐ Detailed description of work completed.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Read the Entire Manual

Important: Carefully read the entire manual upon receipt of the VRC. Improper installation, alteration, adjustment, service, cleaning, or maintenance could result in death, severe injury, or property damage. Instructions and warnings must be read and thoroughly understood by all operators and users. PFlow Industries, Inc. recommends that the owner conduct regular staff training including safety instructions on a regular basis to avoid the risk of accident or damage to the VRC.

Following procedures other than those indicated in this guide to install, use, and maintain the VRC is considered inappropriate and may cause fatal accidents, personal injury, or property damage, in addition to invalidating the warranty.

Intended Purpose

The intended purpose of the PFlow Industries, Inc. Vertical Reciprocating Conveyor (VRC) is to provide a safe and simple means of moving materials only, up to the VRCs rated capacity, from one level to another. VRCs are ***not*** elevators. The VRC is exclusively intended for use in establishments where all operators have been trained to understand the purpose, limitations, and associated hazards of the VRC. Any other use is strictly forbidden.

Potential Risks and Possible Misuse

PFlow Industries, Inc. has attempted to protect against as many hazards as possible. The following potential risks should be addressed before the VRC is put into operation:

- Risk of injury caused by falling products.
- Risk of injury caused by product extending beyond the confines of the carriage.
- Risk of injury caused by exceeding the weight capacity of the VRC.
- Hazards occurring at places where the VRC connects to incoming and outgoing conveyors.
- Risk of injury if any safety features are bypassed.
- Risk of injury due to the use of corrosive chemicals or water jet.

Safety Alert Symbols

To ensure your safety and the safety of those around you, it is important that you read, observe, and understand ALL safety precautions relative to a particular task. Safety precautions in the manual are labeled with an alert symbol followed by the word **DANGER**, **WARNING**, or **CAUTION**.

This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠DANGER Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

⚠WARNING Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE Used to address practices not related to physical injury.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

⚠ DANGER

- Stay within the rated lift capacity.
- Make sure all safety devices are in place and operable before using the equipment. If any safety device is missing or inoperable, immediately remove the equipment from service.

- High Voltage! A licensed electrician must install all electrical connections and permanent wiring in accordance with applicable local or national electrical codes. Make sure the equipment is properly grounded in accordance with local electrical codes or, in the absence of local codes, with the current edition of the National Electrical Code NFPA No. 70.
- Falling section hazard! Make sure all sections, box lift panels, enclosure panels, and components are properly supported during installation. Illustrations may show these elements unsupported in order to make the equipment and installation instructions clearly understood.
- Keep clear of unsupported platforms. Stay out of the area under a raised platform. If a maintenance operation requires the carriage to remain in the raised position, refer to Bulletin 15709-0083 for additional information or contact PFlow Industries, Inc. Customer Support Department for assistance.

⚠ WARNING

- This equipment can be dangerous if not used properly. Allow only competent adults who have been properly trained and authorized personnel to operate this equipment.

- Passengers are not permitted. Riding may result in death or serious personal injury.
- This equipment must be maintained to ensure safety. Allow only properly trained personnel to service the equipment. Implement a routine safety inspection plan and follow the recommended preventive maintenance schedule in the owner's manual.

- Lockout/tagout equipment before performing any adjustments or maintenance. If the equipment is not locked out, it could start unexpectedly and cause injury or damage. ***Make sure all personnel are aware of the potential for stored energy to be present even after the power has been locked out.*** Refer to ANSI Z244.1 and OSHA 29 CFR 1910.147 for minimum requirements for a lockout/tagout system. There may be additional country, state, or local requirements.

- Components and accessories may be heavy. To prevent serious injury, use the appropriate lifting apparatus when handling the components and installing the VRC.

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

⚠WARNING

- If any defects relating to operating safety and reliability are detected or if any damage occurs, the VRC must be taken out of operation immediately.
- Before the VRC is put into operation, all VRC parts must comply with all relevant health and safety directives and regulations.
- Do not switch the main power supply on or start the VRC when persons are in contact with the VRC.

- Make sure that no persons or objects are within the range of any moving parts of the VRC.

- Climbing, sitting, walking, or riding on equipment while the equipment is in operation could result in death or serious injury.
- If this VRC needs to be modified in any way, contact PFlow Industries, Inc. for assistance. Do not make any unauthorized changes.

- Close all doors before the carriage is moved. Never leave the VRC unattended with the doors in the open position. Never close doors when a person is on or below the carriage.
- Place the load in the center of the carriage platform to avoid shifting loads. Lock rolling casters in place. Make sure that any portion of the load does not overhang the perimeter of the carriage. Prevent unstable load conditions.
- If the carriage deck does not stop after contact has been made with the limit switch arm, or continues to drift past the floor level, the limit switch is not working properly. Discontinue use of the VRC and contact PFlow Industries, Inc. for assistance.

- Lockout/tagout the VRC before removing jammed product. Be aware that stored energy in the lift components may move or shift when the jam is removed. De-energize any circuit before work is begun.
- Do not overtravel! Stops, mechanical or electrical, must be in place to prevent the carriage from traveling beyond the intended floor level. Overtravel could cause permanent damage to the carriage or failure of the lifting mechanism.

- Entanglement hazard! Secure long hair, wear snug-fitting clothing, and avoid wearing jewelry while using the VRC.

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

⚠CAUTION

- Inform personnel about the location and operation of emergency stops and power disconnection points.
- During operation, the surfaces of some components may become hot. Avoid touching hot surfaces or wear protective gloves.
- If any unsafe or unusual conditions are observed, stop the equipment and remove it from service. Report the condition to your supervisor.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Electrical Safety Precautions

⚠DANGER

High Voltage! Employees servicing or maintaining VRCs may be exposed to death or serious personal injury if hazardous energy is not properly controlled. De-energize any circuit before work is begun. Follow your facilities procedures or OSHA lockout/tagout (LOTO) procedures anytime maintenance or service is being performed on any electrical box or component.

⚠CAUTION

The incoming voltage source must match the voltage identified on the rating tag. The rating tag provides essential technical information required for any installation, maintenance, or repairs. Do not remove, damage, or modify the rating tag.

De-energize the Circuit

1. Lockout/tagout whenever any work, maintenance, or service is performed on any electrical box or component. Make sure circuits are de-energized before starting work, using a functional, properly rated, and well maintained multimeter or voltage sensing device. Make sure the device is rated for the level of voltage being measured and is sensitive enough for the application.
2. Use fuse pullers to change a fuse; ***never*** use bare hands, pliers, or screwdrivers.
3. Install covers on exposed electrical devices or wires to protect personnel from serious injury.
4. Ground all metal connection boxes, switch boxes, starting boxes, transformers, motors, limit switches, interlocks, and push-button stations to prevent shock to personnel.
5. When using a portable meter, never leave one lead dangling with the other lead connected. Anyone touching the lead may receive a shock through the meter.
6. Make sure that all is clear following lockout/tagout procedures before applying power to a circuit. This is necessary in order to protect personnel from injury and to prevent damage to the equipment.
7. Avoid accidental contact with equipment or conductors which are known to be energized or are ***not*** known to be de-energized. If it is necessary to work on equipment while it is energized, use extra care. Always test and repair equipment that appears damaged or delivers an electric shock.

Take time to be careful! Follow all safety precautions to prevent death or personal injury.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Electrical Safety Precautions

⚠ DANGER

High Voltage! To prevent serious injury, death, or property damage, all electrical connections and permanent wiring must be installed by a licensed electrician in accordance with applicable local or national electrical codes. Arc flash and shock hazard appropriate PPE is required. This equipment must be adequately grounded in accordance with local electrical codes or, in the absence of local codes, with the current edition of the National Electrical Code NFPA No. 70.

Working on Energized Circuits

When electrical repair or maintenance work is required that prohibits de-energizing the circuits involved, extreme caution must be used. The work should be completed only by authorized, well trained and supervised personnel who are fully aware of the dangers involved. All practical safety measure must be used to protect the personnel performing the required work. In addition to the NFPA No. 70 codes, the following precautions **must** be taken:

1. Remove all wristwatches, watch chains, rings, necklaces, metal appendages to clothing, oversized metallic belt-buckles, metal piercings, or loose clothing. These items have the potential to make accidental contact with energized surfaces. In addition, secure long hair with a hair net or cover with a plastic helmet.
2. Remove all hair barrettes or bobby pins. These items are electrically conductive and accidental contact may cause serious personal injury.
3. Wear dry clothing and shoes. Moisture should not be present on the soles of shoes. Water is electrically conductive and accidental contact may cause death or serious personal injury.
4. Insulate the worker from the ground. Cover any adjacent grounded metal surfaces with an insulating material. Suitable insulating materials are dry wood, rubber mats, dry canvas, dry phenolic material, or heavy, multi-ply paper (cardboard). Make sure that the insulating material has no holes present and there are no conductive materials (e.g., staples) embedded. Cover a sufficient area with the insulating material to make sure that adequate space is permitted for worker movement.
5. Use insulated tools when working on energized circuits or fuse box. These insulated tools must be rated to withstand the voltage of the energized circuits.

Notes for the Installation Electrician

The installation electrician must take the following precautions:

1. Locate and review the electrical schematics furnished with the equipment.
2. Verify the proper fit-up, wiring and operation of all required electrical components.
3. Mount the push button station out of reach of someone located on the carriage (approximately 6' [1,829 m]).
4. Wire standard lift limit switches on the chain tensioning assembly (see the job specific electrical schematic as required) for mechanical VRCs as follows:
   If the tensioner chain becomes slack causing the arm on the limit switch to move down or if a strong tension is exerted on the tensioner chain causing the arm to move up, there is a break in the control power. The limit switches are designated with an LS# on the electrical schematic.

Entrance Below a Raised Carriage Deck

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Safety First

The most common reason to access the area below a raised carriage deck is to clean debris from the pit or hoistway. This is best accomplished using a long handled broom or rake to avoid entry under the raised carriage deck. Entry under the raised carriage deck is acceptable only when unavoidable and then only if the proper precautions are taken. It is the user's responsibility to ensure that the following conditions be met before allowing qualified personnel to enter the area under the raised carriage deck.

- Work must be performed by qualified maintenance technicians.
  - ◊ A qualified person is defined as a person who, by possession of recognized degree or certificate of professional standing or by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve problems relating to the subject matter and work.
- The facility has performed a Risk Assessment per ASME B20.1 5.16
  - ◊ Reference OSHA 3071 for Job Hazard Analysis
  - ◊ Reference CEMA Technical Report 2015-01, ASSE Z590.3, and MIL-STD-882 for Risk Assessment examples.
- A proper lockout/tagout (LOTO) procedure has been performed on the VRC.
  - ◊ Refer to ANSI/ASSE Z244.1-2003 (R2014), Control of Hazardous Energy — Lockout/Tagout and Alternative Methods, and OSHA Standard 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout).
- At least two (2) means of support are used to secure the raised platform.
  - ◊ The lifting systems can be used as one means of support provided that no work is to be done on the hydraulic system or mechanical drive system and an appropriate LOTO has been performed on the VRC.
  - ◊ Additional means of support include adequately sized maintenance chains, maintenance pins, DeckLocks, or straps with shackles around the drivebase that are capable of supporting the weight of the carriage.

Minimize the Hazards

Every employee must be aware of the hazards before entering the area under a raised carriage. Take appropriate steps to minimize these hazards and any others that are identified. Some of the more common hazards are:

- Inadequate refuge space
- Confined space
- Improper air quality
- Inadequate lighting
- Improper access
- Tripping hazards
- Unsafe or lack of pit ladders
- The presence of moisture/water/oil
- Moving equipment

General Guidelines

- Where a VRC is operating in a multiple unit hoistway, that portion of the hoistway where the work is to be performed shall be fully separated or accessible equipment locked out.
- Ensure that all portable lights and tools are connected through a Ground Fault Circuit Interrupter (GFCI).
- Provide adequate lighting especially if in a shaftway.
- For a deep pit, never "jump" into the pit – always use a ladder.
- Use proper hand protection while cleaning the area beneath a raised carriage.
- Remove parts, lubricants, cleaning equipment, etc. from inside the pit.
- Do not stand on the hydraulic piping or electrical conduit.
- Never straddle over the traveling cable(s) if so equipped and protect it against damage.

Entrance Below a Raised Carriage Deck

MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Pit Access

Access to the area beneath the raised carriage deck can be gained through manual measures implemented by qualified maintenance technicians.

Manual Access

1. Call the carriage to the lower level.
2. Open the lower gate and bypass the gate open switch at the interlock or in the main control panel. If there is any confusion about how to do this, call PFlow Industries, Inc. Customer Support Department.
3. Barricade the lower level gate opening to prevent unintended access and provide hazard warning signs.
4. Verify that the carriage is empty. Raise the carriage to the upper level making sure all personnel are clear of the moving carriage.
5. Lockout the VRC in accordance with the facility lockout/tagout program.
6. Secure the carriage at the upper level using adequately sized maintenance chains, maintenance pins, or straps with shackles around the drivebase that are capable of supporting the weight of the carriage to provide additional safety.

NOTICE

Do not attempt to do any work on the lifting system (e.g., hydraulic system, motor drive). When work is to be done on the hydraulic system or mechanical drive system, a different procedure must be followed. The carriage must be landed on stands or secured by another means in order to prevent any weight from relying on the lifting means or when the hydraulic pressure is fully relieved. Consult PFlow Industries, Inc.

7. Return to the lower level and verify that the gate and the carriage does not move if the push-buttons are pressed. Wedge or block the lower level gate in the open position to prevent the gate from closing while someone is in the pit area.
8. Perform the necessary maintenance, adjustments, or cleaning under the carriage.
9. Exit the pit and remove the wedge or block holding the lower level gate open.
10. Reverse the process to return the VRC into service.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Unique Descriptions and Names

PFlow Industries, Inc. has incorporated, as well as created, a number of unique descriptions, names, and terminology for parts, components, and devices included in the Vertical Reciprocating Conveyor (VRC). This glossary includes these unique terms and other common terms to help understand this manual and the information it contains. In addition, the glossary will aid the user in communicating the correct information during troubleshooting and service situations. Although the wording and descriptions may sound familiar to the person who has read the manual, other terms and descriptions might not. It is recommended by PFlow Industries, Inc. that this glossary be reviewed before reading the remainder of this manual.

Alkyd paint	A fast-drying enamel paint, color-mixed per the customer's request, and applied using standard methods as specified by the paint manufacturer.
ANSI	American National Standards Institute: www.ansi.org
ASME	American Society of Mechanical Engineers: www.asme.org
Authorized person	Trained or qualified personnel approved to perform a specific duty or duties.
Capacity	The maximum load for which the VRC is designed.
Carriage	The entire structural assembly that travels on the guide columns and carries the load.
CEMA	Conveyor Equipment Manufacturers Association: www.cemanet.org
Chain	See Lift chain and Roller chain.
Chain Driven Live Roller (CDLR)	A horizontal conveyor that is driven by separate loops of chain or a continuous chain. The chain contacts all roller sprockets, depending on the type and function of the horizontal conveyor. Either double or single sprockets are fitted to the horizontal conveyor rollers.
Chain tensioner	A device that monitors the lift chain tension. If the lift chain is too tight, becomes slack, or breaks, the limit switch mounted on the chain tensioner will trip and remove control power.
Constant pressure push-button	A push-button which must remain pressed and maintained by the operator in order to perform a desired operation. If the push-button is released, the desired operation will stop.
Controls	Any combination of electrical devices used to control the operation of a VRC. This normally includes push-buttons, relays, limit switches, interlocks, etc.
Control panel	An enclosure housing various electrical components that control the VRC.
Control voltage	The control voltage is typically provided by the control transformer and is used to energize the various low voltage electrical devices.
Conveyor, Vertical Reciprocating	See Vertical Reciprocating Conveyor (VRC).

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Dead load	A static load that is a permanent force, acting on a structure (see Platform).
Deck	The floor of the carriage (can be smooth plate, tread plate, or open).
Drivebase assembly	Gear reducer, brake motor and mechanical components that power the chain that lifts and lowers the carriage for mechanical VRCs. This assembly is mounted at the bottom of box lifts.
Drift	The action of a lift carriage slowly dropping, usually due to slight mechanical slippage of a motor brake.
Effective width/length	Refers to usable space for the materials load on the carriage, not the overall dimensions which includes space allowed for carriage side guards.
Electrical cable	Electrical cables consist of at least two conductors contained within a protective outer cover.
Epoxy coating	Abrasion-resistant, two-part industrial-strength protective coating system applied over sandblasted and primed steel or direct to metal. The epoxy coating is ideal for outdoor, chemical, or caustic wash-down environments or applications where standard alkyd enamel is viewed as insufficient.
Expanded metal (EM)	A sheet of metal uniformly slit and stretched, forming diamond-shaped openings in the metal sheet. Expanded metal is a one piece construction that will not unravel under normal circumstances and will hold its shape. Expanded metal comes in a standard (raised) or flattened diamond pattern in a variety of gauges, opening sizes, materials and sheet sizes.
Explosion proof (EXP)	Electrical devices (e.g., control panels, motors, limit switches) that are designed to operate safely in a specific location or area where potentially explosive environments can or do exist.
Floor-to-Floor distance	The distance from one operating floor level to the adjacent operating floor level (see Vertical travel).
General Arrangement (GA) drawing	The drawing produced by PFlow Industries, Inc. which shows the VRC. The drawing may show but does not specify building details.
Guarded by location	Describes moving parts so protected by the parts remoteness from the floor, platform, walkway, or other working level, or by the parts location with reference to the frame, foundation, or structure to reduce the foreseeable risk of accidental contact by persons or objects. The parts remoteness from foreseeable, regular, or frequent presence of public or employed personnel may constitute guarding by location in reasonable circumstances. (See ASME B20.1 standard)
Guide angles	Guide angles are attached to the guide column to help capture and contain the guide wheels in the columns and guide the carriage.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Header	Header refers to the horizontal structure spanning the width of the carriage. The carriage header defines the load height.
HMI (Human Machine Interface)	The user interface in the control system that provides graphic control of the VRC. The HMI communicates with the programmable logic controller (PLC).
Hollow shaft	VRC mechanical shaft of the mechanical drivebase which penetrates the gear motor rather than coupling to the gear motor. This minimizes wear points.
Incoming voltage	The main voltage being supplied for operation of the equipment.
Interlock (Door)	An electro-mechanical locking system used on the gates or access doors of a VRC. The system prevents the VRC operation unless all such gates or access doors are closed. The system also prevents the opening of any such access door unless the VRC carriage is present at that particular opening.
Intermediate level	A floor level or levels between the uppermost and bottommost operating floor.
Junction box	An electrical control box used to join, centralize, and distribute wiring from different locations.
Keylock control	A keyed push-button station that prevents unauthorized use of the VRC.
Knock-down (KD)	Lift components shipped in two or more pieces. Typically field welding is required (e.g., KD carriage, KD headers, KD uprights, KD gates, etc.).
Lift chain	A chain that lifts the carriage and load.
Lift location light	Illuminated push-button that indicates at which level the carriage is located.
Lifted load	The total weight that the VRC is designed to lift at a specific speed. Typically, this is the dead load plus live load (see Rated load).
Limit switch	An electrical device which is used to control the carriage position and monitor various mechanical devices.
Load pattern	A method to describe the direction a load can be moved on and off a carriage at different operating floors or levels. These can be used in combinations. ● **"C" load pattern:** Carriage configuration allowing a load/unload opening on one side of the carriage deck. ● **"Z" load pattern:** Carriage configuration allowing a load/unload opening on opposite sides of carriage deck. ● **"90 degree" load pattern:** Carriage configuration allowing a load/unload openings at right angles on the carriage deck.
Load test	The carriage is loaded to rated capacity, and the VRC is operated.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

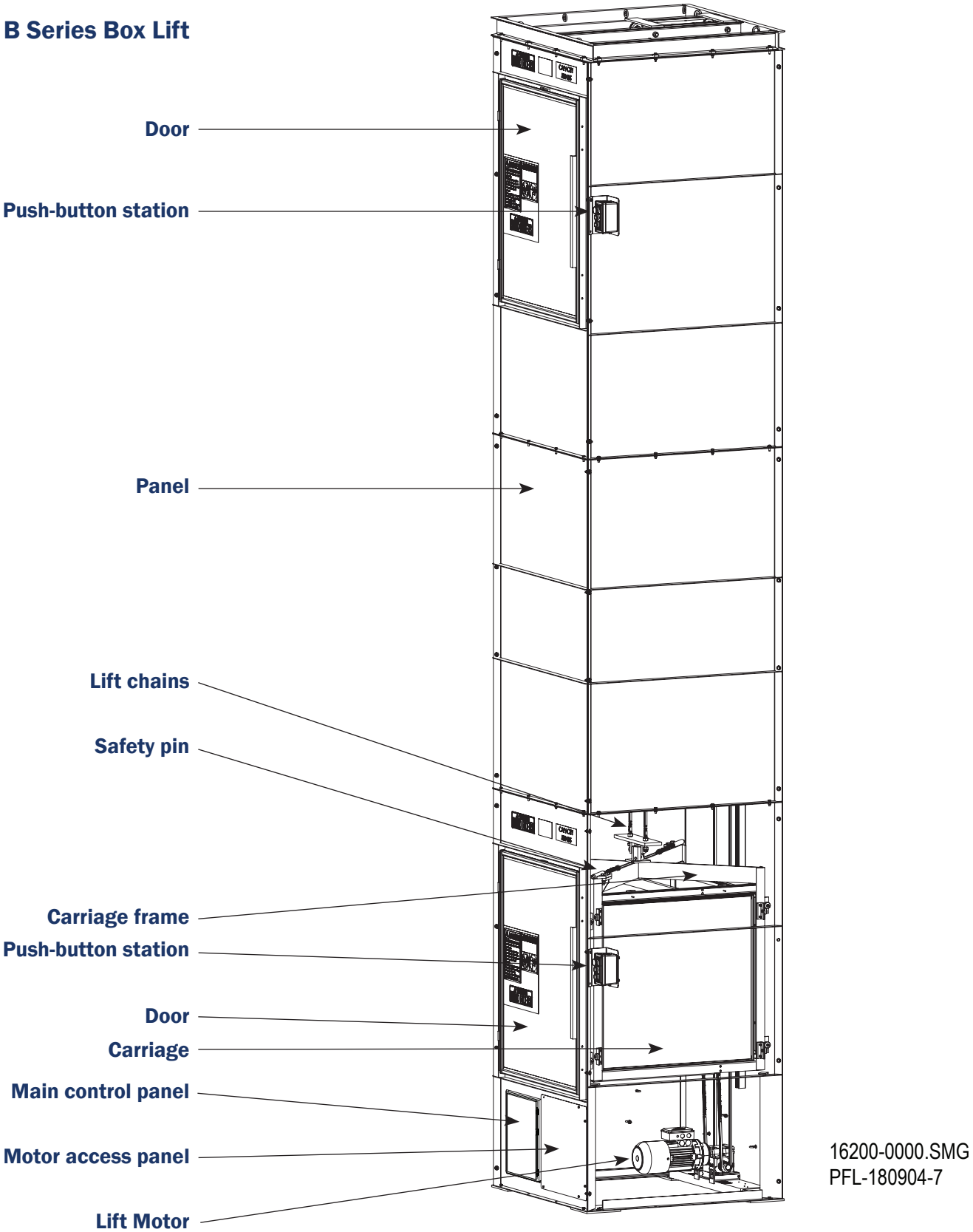
Macropoxy	Macropoxy is a fast drying, polyamide epoxy designed to protect steel in industrial exposures. Ideal for protection of sharp edges, corners, and welds.
Momentary contact push button	A push button which only has to be pressed for an instant to activate the desired operation.
Operating end	The side(s) of the carriage used for loading/unloading.
Overall dimension	The outside dimension of the carriage structure or the entire lift.
Overtravel limit switch	A safety device provided on mechanical VRCs to stop carriage travel beyond the uppermost or lowermost floor level if the floor level positioning limit switch fails.
Photo eye	Photoelectric sensor that uses a focused beam of light to span the distance to a reflector. The VRC controls receive a signal when the reflected bean of light is detected by a sensor.
Platform	The structure that forms the floor of the carriage and that directly supports the load (see Deck).
Programmable Logic Controller (PLC)	A micro-processor based device that controls the VRC through a resident software program.
Push-button (PB) station	The wall mounted, pedestal mounted, or hand-held device used to control the operation of the VRC.
Qualified person	A person, who by possession of a recognized degree, certificate, professional standing, or skill, and who by knowledge, training and experience, has demonstrated the ability to deal with problems relating to the subject matter, the work, or the project.
Rated load	The weight the VRC is designed for and installed to lift at a rated speed (see Lifted load).
Reflector	A plastic, prismatic object used to reflect a beam of light emitted from a photoelectric sensor.
Roller chain	The type of chain drive most commonly used for transmission of mechanical power. The roller chain consists of a series of short cylindrical rollers held together by side links and connecting pins. The roller chain is driven by a toothed wheel called a sprocket.
Safety cam	Spring-loaded, hardened steel cam directly attached to the lift chain or gate chain that engages if the lift chain or gate chain breaks or slackens, preventing the carriage from dropping more than a few inches.
Side guards	A protective enclosure on the outermost edge of the inoperable sides of the deck welded to the carriage to contain material. Can be rails, sheet steel, or expanded metal.
Slack chain device	A device that monitors a chain and trips if the chain goes slack. If the chain becomes slack or breaks, the limit switch mounted on the slack chain device will trip and remove power to the circuit.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Sprocket	A wheel typically mounted on a shaft. The wheel has a row of teeth around its edge that fit into the links of a chain.
Top of roller (TOR)	Top elevation of a horizontal conveyor system roller which is also the lower elevation of the load.
Touchscreen	See HMI.
Travel	The difference in elevation between the bottommost level of the carriage platform and the uppermost level of the carriage platform.
UHMW (Ultra-High Molecular Weight)	An abrasion-resistant, high-impact, polyethylene material used throughout the VRC to protect and/or guide moving parts.
VFD (Variable-Frequency Drive)	A VFD is a type of drive used in electro-mechanical drive systems to control AC motor speed and torque by varying the motor frequency and voltage.
Vertical travel	Distance the carriage deck travels; floor to floor or total distance (see Travel).
Vertical Reciprocating Conveyor (VRC)	A reciprocating power actuated lifting device (not designed to carry passengers or an operator) that receives loads on a carriage and transports these objects from one operating elevation to another.
VRC specification sheet	PFlow Industries, Inc. informational data sheet providing general information on a specific VRC.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

B Series Box Lift



16200-0000.SMG
PFL-180904-7

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Field Electrical Wiring Standards

All electrical wiring and craftsmanship completed in the field shall be in accordance with existing state, local and National Electrical Code (NEC) standards.

Definitions

In-field electrical wiring — All hard wiring of all electrical devices external of control panel.

Control circuit — The control circuit refers to all circuits and devices at 120 VAC and below.

Power circuit — Power circuit refers to all circuits and devices at 208 VAC and above.

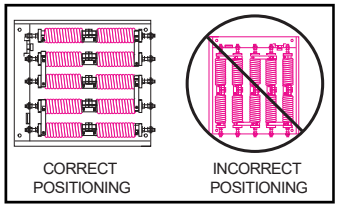
Systems — Systems refers to automated vertical and horizontal conveyors.

Requirements

1. It is recommended that all control circuit wiring is #14 AWG, copper, stranded, type THHN or equal, 600 VAC.
2. It is required that all power circuit wiring is #12 AWG minimum (sized appropriately for the load), copper, stranded, type THHN or equal. A green grounding wire shall be provided to power devices.
3. Per NFPA 79, the colors of individual conductors shall be:

   Power wiring - Black
   115 VAC - Red
   115 VAC neutral - White
   24 VAC - Red/black
   24 VAC neutral - White
   24 VDC - Blue
   0VDC - White/blue
   Ground - Green or green/yellow

   Note: These colors only apply to individual conductors. These colors do not apply to prefabricated cables.
4. All wires must be labeled on each end with the wire number from the electrical drawing using a machine or computer generated label, utilizing black characters on a white background.
5. All field devices must be individually terminated in the control panel.
6. Screw on solderless connectors (wire nuts) shall be of the insulated type, spring lock, and of the proper size to accommodate wires.
7. Terminal lugs shall be of the insulated type, crimp style, and of the proper size to accommodate wire(s) and terminal fasteners.
8. Conduit and related hardware shall conform to local, state, and NEC standards. The minimum size shall be 1/2". Connectors and couplings shall be appropriate for conduit type.
9. Flexible conduit shall be a minimum of 1/2", shall be of the liquid-tight type, and shall be installed with compatible liquid-tight connectors.
10. The customer shall locate and install a fused disconnect switch within the line of sight of the control panel. The customer shall ensure accessibility to the disconnect switch with regard to existing electrical codes and standards.
11. Control wiring and conduit shall be separate from the power wiring and conduit.
12. When mounting resistor banks, make sure the resistor elements are horizontally positioned.
13. Drop cords (flexible cords) shall be multi-conductor festoon-type cable where applicable.



Resistor Bank Positioning

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Electrical Ruling Bodies

NEMA	***National Electrical Manufacturers Association*** provides national testing and manufacturing standards body of electrical apparatus.
UL	***Underwriters Laboratories, Inc.*** is an independent testing laboratory. Many local codes require UL control panels and electrical apparatus.
JIC	***Joint Industry Council*** is an advisory group that provides standards for production equipment, safety, and dependability.
NFPA	***National Fire Protection Association*** is the ruling board of NEC and sets national fire and safety standards for equipment and manufacturing facilities.
CSA	***Canadian Standards Association*** is a regulatory agency of Canada.
ANSI	***American National Standards Institute*** oversees the creation, promulgation, and use of thousands of norms and guidelines that directly impact businesses.
ASME	***American Society of Mechanical Engineers*** is a leader in technical innovation with a focus on advancing and applying engineering knowledge and communicating the excitement of engineering. This group is the Secretariat for ANSI.
NEC	***National Electrical Code*** is an advisory board to NFPA with recommendations and codes usually adopted throughout the United States.

PFlow's Standard

NEMA 12 classification is to be used in a general purpose, indoor only application.

All PFlow Industries, Inc. control systems are built to a NEMA 12 minimum classification. All PFlow Industries, Inc. control systems conform to the following standards:

- ***NFPA 70 (NEC):*** The National Electrical Code.
- ***NFPA 79:*** Electrical standard for industrial machinery.

Outdoor Application

Outdoor equipment or electrical devices exposed to severe weather conditions should not be rated less than NEMA type 4. This is a watertight, dust-tight, indoor-outdoor classification that will provide protection against splashing water, seepage of water, falling or hose-directed water, and severe external condensation.

Corrosive Application

The chemical industry on the whole usually specifies a minimum NEMA type 4X. A NEMA 4X rating is similar to a NEMA 4 with added corrosion resistance.

15709-0085 | Rev C | 2022-02-01 | e-mail csd@pflow.com

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

PFlow's Standard (continued)

Hazardous Location

Hazardous locations are an extremely specialized electrical classification. Few electrical experts exist in this field. All hazardous locations must be handled as defined by the class, division, and group designator for the job site condition.

The NEC has three classes (I, II, III), - two divisions, (1 and 2) and seven group designations (A, B, C, D, E, F, and G).

Class Definitions

Class I locations: Locations in which flammable gases, flammable liquid-produced vapors, or combustible liquid-produced vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

Class II locations: Locations that are hazardous because of the presence of combustible dust.

Class III locations: Locations that are hazardous because of the presence of easily ignitable fibers or where materials producing combustible flyings are handled, manufactured, or used, but in which such fibers/filings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixture.

Division Definitions

Division 1 is an extremely dangerous explosive condition that exists normally.

Division 2 is a dangerous explosive condition that could exist but usually does not.

Group Designations

Group designations are given by the NFPA, State Fire Marshals, insurance companies or consulting engineering firms according to the gasses, dust, or other particles in the area and the spark or temperature needed to produce an explosion.

PFLOW INDUSTRIES
MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Arrival

A fork truck capable of lifting approximately 4,000 lbs. (1814 kg) is required. Larger Vertical Reciprocating Conveyors (VRCs) may require a heavier lifting capacity fork truck or crane. Refer to the shipping weights for the equipment required for your job. Prior to shipping, PFlow Industries, Inc. takes pictures of all the items shipped, contents of the parts crate, and individual boxes to make sure the shipment is complete.

NOTICE

The material in the boxes, cartons, etc. are delivered to the carrier agent complete and in good condition. Report shipping damage or discrepancies immediately to the PFlow Industries, Inc. Customer Support Department. ***PFlow Industries, Inc. is not responsible for damage due to shipping or receiving once the equipment has left the factory nor will PFlow Industries, Inc. file any claims for damage that may occur.***

Inspection

Upon receipt, conduct an immediate inspection while the equipment is still on the truck or immediately after it is moved to the receiving area. Do not wait until after the equipment is moved to a storage area.

Verify that the number of items on the Bill of Lading agrees with the number of items delivered. Examine all pieces to determine if damage has occurred during transit. Do not sign a delivery receipt or a freight bill until a proper count has been made and inspection of all packages are complete. Should damage occur in shipment, it is a matter between the carrier and the consignee. In such cases, the carrier is assumed to be responsible for the safe delivery of the equipment, unless negligence can be established on the part of the shipper.

Verify the dimensions of the delivered materials against the PFlow Industries, Inc. General Arrangement (GA) drawing. If anything is missing or incorrect, contact the PFlow Industries, Inc. Customer Support Department immediately. Failure to notify the PFlow Industries, Inc. Customer Support Department may affect the completion time of the installation. The warranty does not cover lost time and/or additional trips for missing or damaged components.

Transportation Damage and Claims

1. Note all visible loss or damage that has occurred directly on the carrier's delivery receipt.
2. Have the driver sign the delivery receipt. If the driver refuses to sign, make a notation of this refusal on the receipt.
3. If the driver refuses to allow inspection, write the following on the delivery receipt: ***"Driver refuses to allow inspection of containers for visible damage."*** Have the driver sign the delivery receipt.
4. Contact the carrier's office immediately upon finding damage and request an inspection. Mail a written confirmation to the carrier's office with the time, date, and the person called.
5. Save any packages and packing material for further inspection by the carrier.
6. Promptly file a written claim with the carrier and attach copies of all supporting paperwork. Report all hidden damage directly to the freight carrier within seven days of delivery.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Shipping Photograph Examples

Parts Box

Parts Box Contents

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Shipping Packet

The shipping packet contains the Owner's, Installation, and Maintenance Manual, General Arrangement drawing, electrical schematic, and additional information applicable to the installation.

An additional copy of the schematic is inside the control panel.

Unpack the Equipment

- Save all packing materials for inspection by the carrier.
- Cut and remove the restraining straps.
- Remove the protective shrink wrap and cardboard material.
- Remove all wooden retaining blocks and crating.
- Remove the materials from the pallet.
- Dispose of the packing material in an environmentally responsible manner.

Return Materials Authorization (RMA)

All replacement components needed as a result of any damage will require a purchase order, authorization number, and compliance with PFlow Industries, Inc. Return Materials Authorization (RMA) procedures. The RMA number shall be obtained from PFlow Industries, Inc. Customer Support Department. The RMA number helps to identify and track the component when returned to PFlow Industries, Inc.

Warranty Work

Warranty procedures are included in this manual. All warranty work must be pre-authorized by the PFlow Industries, Inc. Customer Support Department prior to starting work.

1. Notify the PFlow Industries, Inc. Customer Support Department of the problem for authorization.
2. PFlow Industries, Inc. will determine:
   - The cause of the problem.
   - Who will do the repair work.
   - The repair details involved.
3. If PFlow Industries, Inc. decides that your organization or your subcontractor will do the work, an authorization number will be assigned which must be referenced on all subsequent paperwork.

NOTE *Notify PFlow Industries, Inc. by phone, FAX, or e-mail during the next business day if an event occurs during our non-working hours. Issuance of an authorization number does not guarantee approval and or payment.*

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Recommended Tools

The following is a list of recommended tools necessary to expertly install the equipment to industry standards. This is only a guideline. Individual sites and applications may require additional items.

	Welding Machine and Equipment (Helmet, Gloves, Rods)		Fire Extinguisher
	Lifting Cables, Straps, Slings or Chains with the required load capacity rating		Socket Set: 3/8" Drive Sockets Sizes to 3/4"
	Chain Fall with the required load capacity rating		Hammer Drill & Bits: (3/8", 1/2" Anchors; 4" Length Minimum)
	Scissor Lift (optional but helpful)		Open or Box End Wrenches to 3/4"
	Fork Lift with the required load capacity rating		Electric Drill and Drill Bits
	Step Ladder(s)		Hex Keys to 3/8"
	Come-Along Tool		Tap set: 1/4-20 to 3/4-10
	“C” Clamps		Sledge Hammer (Plastic)
	Drift Punch		Extension Cords
	Level: 4' (1,219 m) Long		Chalk Snap-Line
	Carpenter’s Framing Square		25' (7,62 m) Measuring Tape
	Pry bar		Rags
	Portable Light		

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

Read this entire manual.

Pre-Installation Responsibilities

Proper preparation of the job site before beginning the installation can mean the difference between an installation that is safe and smooth and an installation that is difficult. Being aware of who is responsible for the listed activities will make sure the installation is a smooth process.

PFlow Industries, Inc. recommends that an installer with knowledge and experience on how to rig and erect structural steel discuss not only these items but all other concerns directly with the people on the job site.

A pre-installation job site visit is always recommended and considered to be included in the responsibilities of the mechanical installer.

End User Responsibilities

1. Assign the authorized on-site contact.
2. Provide the contact information for the authorized on-site contact.
3. Determine the work hours allowed to work on-site.
4. Arrange for other trades or in-plant production to avoid conflict with the proposed installation schedule or between trades.
5. Determine the work procedures and safety guidelines particular to the job site.
6. Communicate on-site safety meetings prior to beginning the installation.

End User and/or Mechanical Installer and/or Electrical Installer Responsibilities

1. Secure any required job site, local, or state permits before beginning the installation.
2. Determine if a local inspection and sign-off is required after the installation has been completed.
3. Unload and transport the equipment to the installation area.
4. Determine storage options (if applicable). Storing the equipment outside will void the warranty. If the equipment is stored indoors for a month or longer, consult PFlow Industries, Inc. for maintenance procedures required to keep the warranty in effect.
5. Prepare all necessary job site areas (e.g., pit, floor opening, adequate bracing locations, shaftway openings, doorways) for the installation.
6. Coordinate any job site or building modifications necessary to get the equipment to the installation area.
7. Determine if the weight and the size of the components exceed the lift requirements to handle and lift the heaviest load. If the weight of the load is in question, please contact the PFlow Industries, Inc. Customer Support Department.
8. Locate the pick-point capable of lifting and handling the necessary components.
9. Determine approved bracing locations and attachment points on the job site. Make sure that the bracing attachment points will withstand the static lateral load for bracing the lift. Details are called out on the GA drawing.
10. Make sure that the floor under the columns will withstand the base plate loading stated on the VSP spec sheet.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Mechanical Installer Responsibilities

1. Conduct a pre-installation job site visit.
2. Review the General Arrangement (GA) drawing for any discrepancies between the GA drawing and the job site.
3. Compare the dimensions listed on the GA drawing to the dimensions on the actual job site.

NOTE *Discrepancies in the pit length, pit width, pit depth, overhead clearances, and a pit that is not square or level are just a few items that could create a problem. These discrepancies must be addressed immediately with PFlow Industries, Inc.*

4. Report any discrepancies to the PFlow Industries, Inc. Customer Support Department.
5. Determine if additional bracing material is required.
6. Complete mechanical erection of the equipment as sold by PFlow Industries, Inc. and called out on the GA drawing, and follow all instructions in the installation manual and safe work procedures.
7. Mount all electrical devices at non-union job sites.
8. Return trip upon completion of the electrical installation and be present for the final checkout, adjustments, and training. Complete and return the Installation Completion Checklist to PFlow Industries, Inc. Customer Support Department at csd@pflow.com

Electrical Installer Responsibilities

1. Review the General Arrangement (GA) drawing for any discrepancies between the GA drawing and the job site.
2. Report any discrepancies to the PFlow Industries, Inc. Customer Support Department.
3. Complete electrical connection of the equipment as sold by PFlow Industries, Inc. and shown on the electrical drawings and GA drawing.
4. Follow all instructions in the installation manual and safe work procedures.
5. Be present for the final checkout, adjustments, and training. Complete and return the Installation Completion Checklist to PFlow Industries, Inc. Customer Support Department at csd@pflow.com

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

Read this entire manual.

General Arrangement (GA) Drawing

Job site conditions may be different than those listed on the GA drawing. This drawing includes configuration and dimensional data specific to the job site:

- Job number
- Equipment dimensions
- Clearance dimensions
- Static lateral load
- Applicable options

The VRC can only be used according to the specifications given in this manual and the General Arrangement (GA) drawing. If the VRC is to be used outside the original design, contact the PFlow Industries, Inc. Customer Support Department to determine if the intended use is possible.

⚠WARNING

Inappropriate and/or modified use of the VRC can result in dangerous safety issues and/or damage. If this VRC needs to be modified in any way, contact PFlow Industries, Inc. for assistance. Do not make any unauthorized changes.

Obtain written confirmation from PFlow Industries, Inc. before using the VRC in a modified or unspecified manner. PFlow Industries, Inc., cannot be held liable for any accidents and/or damages that may occur through inappropriate or unauthorized use of the VRC.

1. Locate the PFlow Industries, Inc. GA drawing in the shipping packet inside the parts crate.
2. Review the GA drawing for any discrepancies.
3. Compare the dimensions listed on the GA drawing to the dimensions of the actual job site and the materials received.

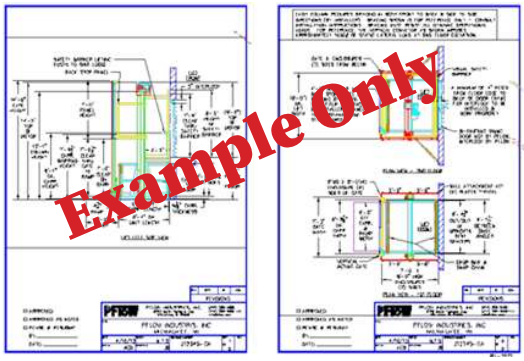
NOTE *Discrepancies in the pit length, pit width, pit depth, overhead clearances, and a pit that is not square are just a few items that could create a problem. These discrepancies must be addressed immediately with PFlow Industries, Inc.*

4. Report any discrepancies to the PFlow Industries, Inc. Customer Support Department.

Contact the PFlow Industries, Inc. Customer Support Department with any questions or concerns at any time throughout the installation of this equipment.

Sample GA Drawing

The sample drawing shown is only an example and is not applicable to this VRC.



MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Frequently Asked Questions

Proper preparation of the job site before beginning the installation can mean the difference between an installation that is smooth and an installation that is difficult. PFlow Industries, Inc. has prepared a list of site specific questions to investigate:

1. Is 3-phase power available for the installation work?
2. Is welding permitted?
3. Is a “hot permit” required?
4. Is a fire watch required? Are there special welding requirements (e.g., special coatings such as epoxy paint, or hot dipped galvanized steel)?
5. Are there any protrusions or rough spots in the floor level or wall space that could interfere with the installation or the operation?
6. Are the floors level?
7. Can the equipment pass through all openings, doorways, hallways, and shaftway openings?
8. Is there other non-PFlow Industries, Inc. equipment to be integrated with the PFlow Industries, Inc. VRC components?
9. Is a job specific bracing drawing required?
10. Is the work site union or non-union?
11. Is the customer’s forklift available for use?
12. Do the weight and size of the Vertical Reciprocating Conveyor (VRC) components exceed the capability of the on-site equipment to handle and lift the VRC components? If the weight of the load is in question, contact the PFlow Industries, Inc. Customer Support Department.
13. Is there a pick-point capable of lifting the necessary lift components?

Contact the PFlow Industries, Inc. Customer Support Department with any questions or concerns at any time throughout the installation of this equipment.

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Mechanical Overview

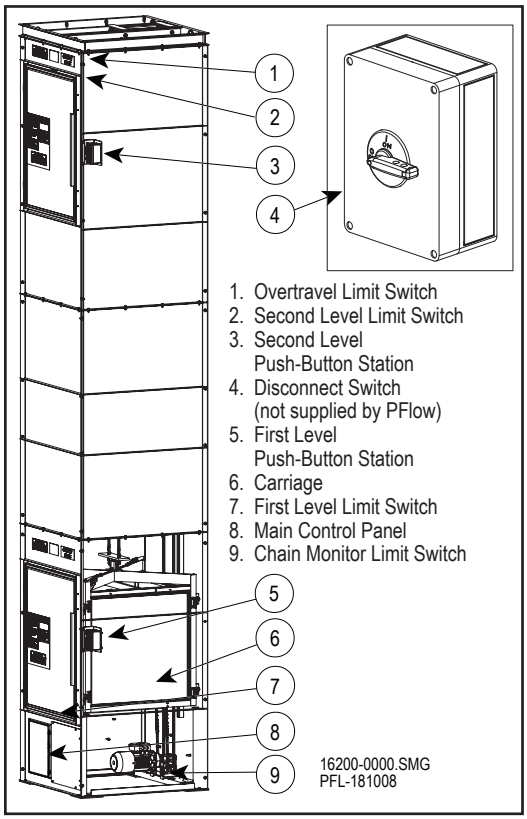
Each B Series Package Handling Lift Vertical Reciprocating Conveyor (VRC) consists of multiple paneled sections, a motor drive assembly with a brake and gearmotor reducer, two (2) lift sprockets, a moving carriage deck, and interlocked safety doors. In addition, a main control panel and typically at least one (1) push-button station per level are furnished. For more information on the electrical components, see Section 12 in this manual.

Modular Steel Enclosure Frame

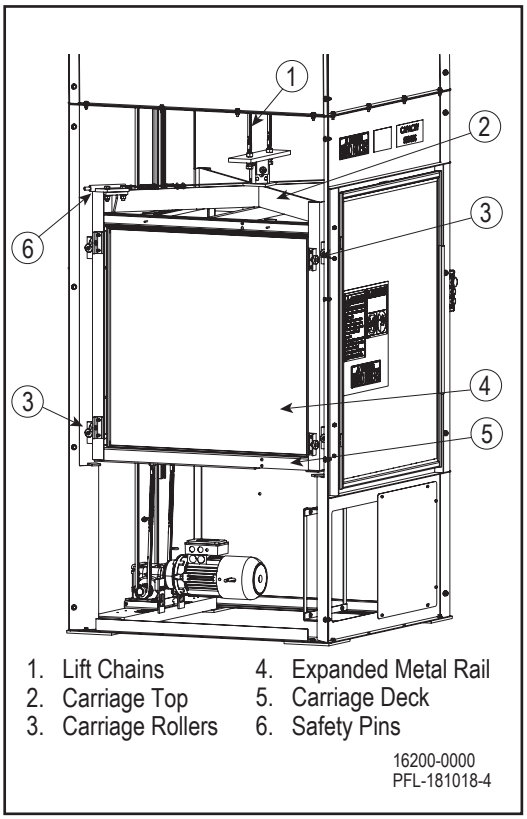
The B Series consists of stackable modular-formed steel panels that provide full-height guarding. The base is anchored to the floor. The stackable sections are bolted together. The upper and intermediate levels are braced to the building structure. Exact bracing varies by application. See Figure 11-1.

Carriage

The carriage consists of a deck, sixteen (16) guide rollers, spring-loaded dual safety pins, and a fully welded carriage top. Placement of the optional full-height expanded metal rails is determined by the application and load pattern. See Figure 11-2.



Modular Frame
Figure 11-1

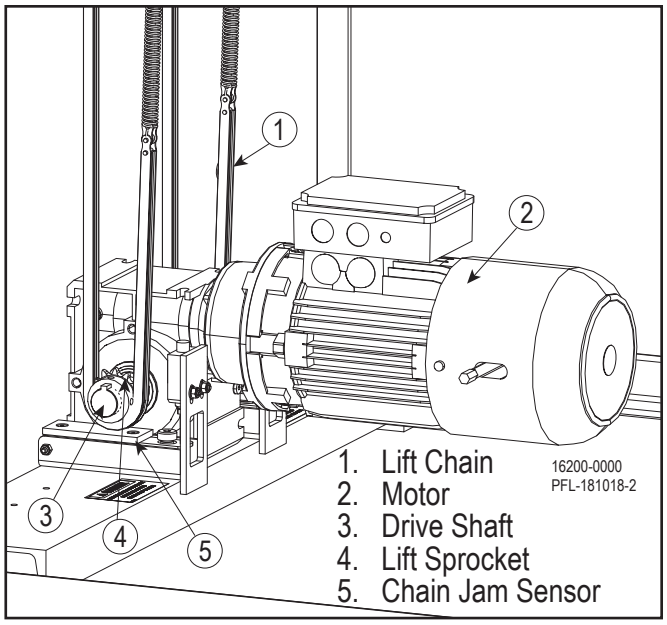


Carriage Details
Figure 11-2

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Motor Drive Assembly

The motor drive assembly consists of a motor, brake, gearmotor reducer (commonly referred to as a gear motor assembly), lift sprockets, a keyed drive shaft, bearings, and a support structure. See Figure 11-3.



Motor Drive Assembly
Figure 11-3

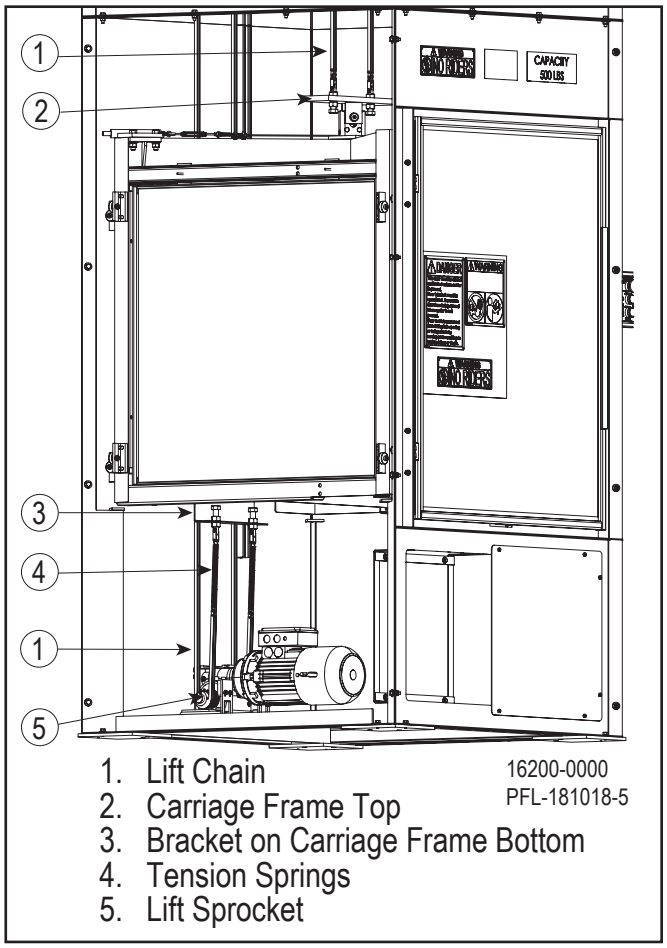
Lift Chains

Dual lift chains connect to the top of the carriage frame, go up and over idler sprockets at the top of the modular frame. The lift chains then travel down and around the bottom lift sprockets. The lift chains are connected to tension springs that attach to a bracket on the bottom of the carriage frame. The tension springs maintain tension on the chains. See Figure 11-4.

If chains become too slack or break and jam between the sprocket and the chain jam sensor, the chain jam sensor is activated to shut off power to the VRC. See Figure 11-3.

NOTICE

This VRC uses special high strength chain. Do not use standard ANSI roller chain or connecting links as a replacement. Contact PFlow Industries, Inc. Customer Support Department for the required chain specification.

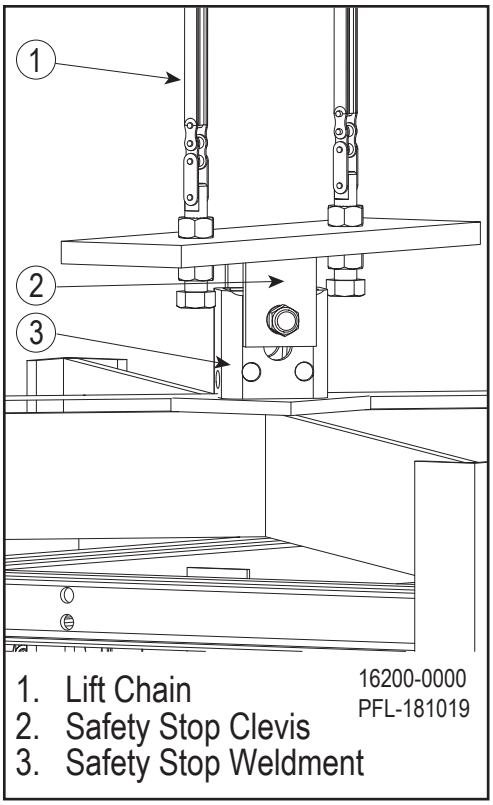


Lift Chains
Figure 11-4

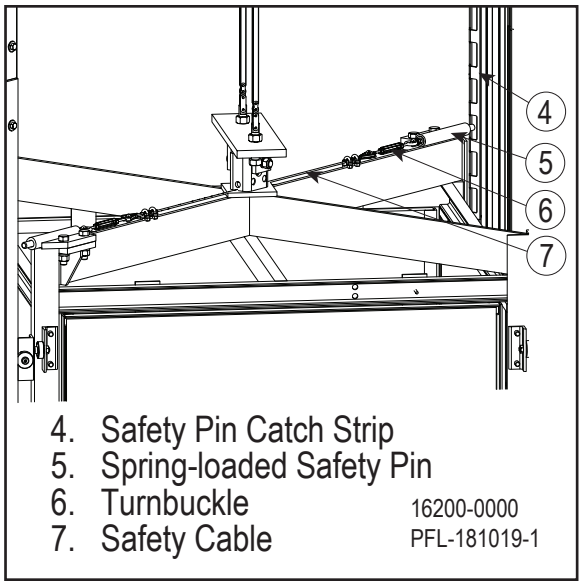
PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Spring-Loaded Safety Pin Function

If the lift chain breaks or becomes slack, the safety stop clevis drops into the safety stop weldment and releases the tension on the safety cable. The spring-loaded safety pins will quickly extend and engage into the safety pin catch strips located in two corners of the modular walls. The carriage is stopped from falling. See Figure 11-5 and Figure 11-6.



Safety Clevis
Figure 11-5



Safety Pin
Figure 11-6

PFLOW INDUSTRIES
MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Electrical Overview

The following is a standard description of the electrical wiring of a B Series Vertical Reciprocating Conveyor (VRC). This does not include any specifics on options available or ordered (e.g., gates). A copy of the electrical schematic can be found in the control panel and the shipping packet originally included in the parts crate.

⚠WARNING

Falling hazard! Make sure all safety devices are in place and operable before using the equipment. If any safety device is missing or inoperable, immediately remove the equipment from service.

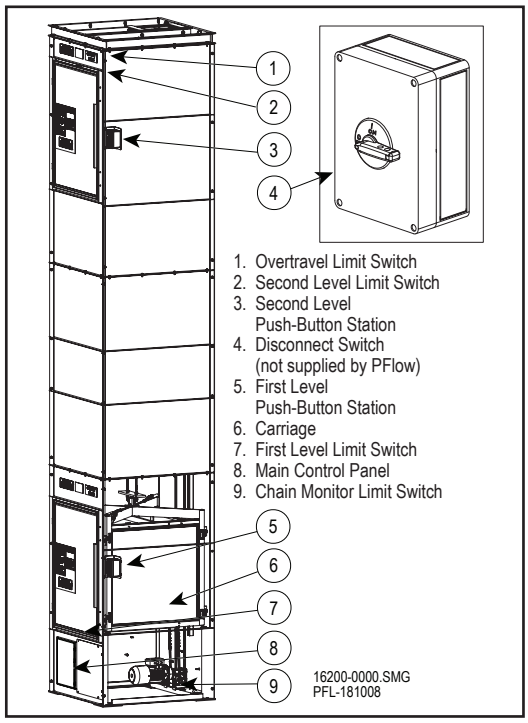
Per ASME B20, all gates or doors accessing the lift area must be electro-mechanically interlocked. This requires electrical contacts to prevent the lift from operating if a gate or door is open when the carriage is at the level and mechanical locks to lock the gate or door until the carriage is at that level.

NOTE

Different door interlock types and styles are supplied depending upon the door type and site conditions. Standard door styles can incorporate one to four electrical components per gate.

Main Control Panel

All electrical devices are connected individually to the main control panel. The main control panel contains a fused transformer, motor starter, relays, etc. A motor overload is provided to protect the motor from excessive current draw.



Electrical Components Figure 12-1

Push-Button Stations

One station is normally supplied for each door. ASME B20.1 code requires that the push-button stations are unable to be activated by someone on the carriage. Each push-button station contains Send to "x" push-buttons and an emergency stop (E-stop).

The Send to "x" push-buttons are momentary contact. This means the operator can press and release the Send to "x" push-button and the carriage will travel to the selected level. The operator does not need to hold the Send to "x" push-button for the carriage to continue moving. When pressed, the emergency stop prevents the carriage from moving. The emergency stop must be pulled out before carriage movement can be initiated again.

Main Disconnect Switch

As required by NEC code, the main disconnect switch [not supplied by PFlow Industries, Inc.] must be lockable and located within line of sight of the control panel and no more than 6' 6" (1,981 m) off the floor.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Motor Assembly

The motor is located in the bottom of the VRC. The motor wiring must be verified prior to energizing the VRC.

Limit Switches

The standard two-level B Series VRC has five (5) limit switches: one (1) at each level to stop the carriage, one (1) overtravel limit switch, and one (1) chain monitor limit switch for each lift chain. All limit switches are factory mounted and wired. VRCs servicing more than two levels require two (2) additional limit switches for each intermediate level.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

Read this entire manual before operating the Vertical Reciprocating Conveyor (VRC).

Service must be performed by qualified and trained service technicians only.

NOTICE

A qualified person is defined as a person who, by possession of a recognized degree or certificate of professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve problems relating to the subject matter and work.

Personnel who carry out work on the VRC must exclusively be qualified personnel who - based upon their education, experience, instructions as well as knowledge concerning relevant standards and provisions, accident prevention, regulations and operating conditions - have been authorized as the person being responsible for safety, to carry out the activities described in these instructions and who - when doing so - are in a position to recognize possible risks early and to avoid them.

⚠DANGER

- Stay within the rated lift capacity.
- Make sure all safety devices are in place and operable before using the equipment. If any safety device is missing or inoperable, immediately remove the equipment from service.

- Falling hazard! Always make sure the carriage is present before placing objects through doorways.
- Keep clear of unsupported platforms. Stay out of the area under a raised platform. If a maintenance operation requires the carriage to remain in the raised position, refer to Bulletin 157013-0083 for additional information or contact PFlow Industries, Inc. Customer Support Department for assistance.

⚠WARNING

- This equipment can be dangerous if not used properly. Allow only competent adults who have been properly trained and authorized personnel to operate this equipment.

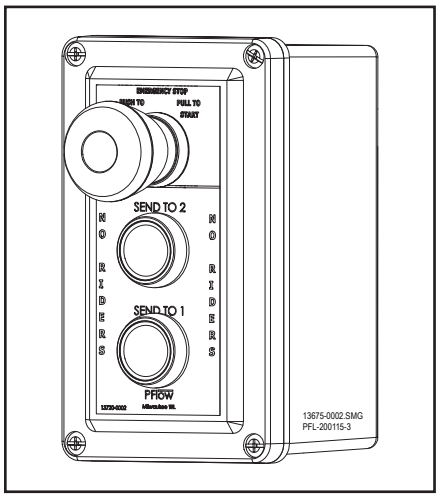
- Passengers are not permitted. Riding may result in death or serious personal injury.
- This equipment can be dangerous if not used properly. Allow only competent adults who have been properly trained and authorized personnel to operate this equipment.
- Avoid Shifting Loads! Place the load in the center of the carriage platform to avoid shifting loads. Lock rolling casters in place. Make sure that any portion of the load does not overhang the perimeter of the carriage. Prevent unstable load conditions.
- Close all gates and doors before the carriage is moved. Never leave the VRC unattended with the gates or doors in the open position. Never close gates or doors when a person is on or below the carriage.

- Entanglement hazard! Secure long hair, wear snug-fitting clothing, and avoid wearing jewelry while using the VRC.

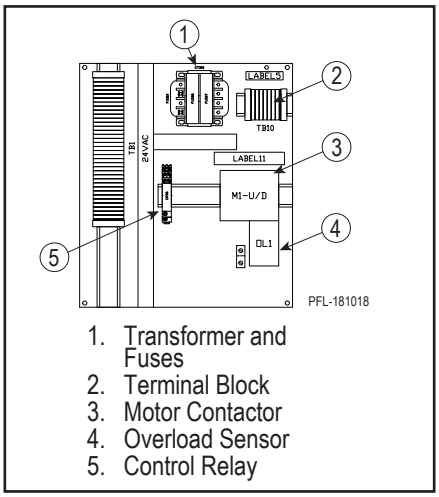
PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Begin Sequence

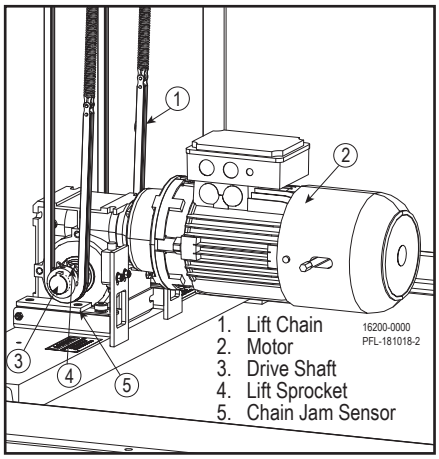
1. Press the desired floor level button on the push-button station. See Figure 13-1. The main lift motor contactor coil energizes, closing the high voltage contacts, which in turn provides power to the main lift motor. See Figure 13-2. This action turns the motor in the needed direction.
2. The motor turns the gears in the reducer, which in turn rotates the drive shaft. See Figure 13-3. The drive sprockets on the shaft turn resulting in the raising or lowering of the lift chains. The lift chains are fastened to the top of the carriage.
3. When the carriage arrives at the next level, the floor level limit switch is actuated by a channel mounted on the top of the carriage. See Figure 13-4. When the floor level limit switch is activated, the motor circuit is opened, the motor stops rotating, and the motor brake sets. This stops and holds the carriage position.
4. The channel mounted on the top of the carriage makes contact with the rub block on the door interlock switch. When the door interlock switch is activated, the door can be opened.



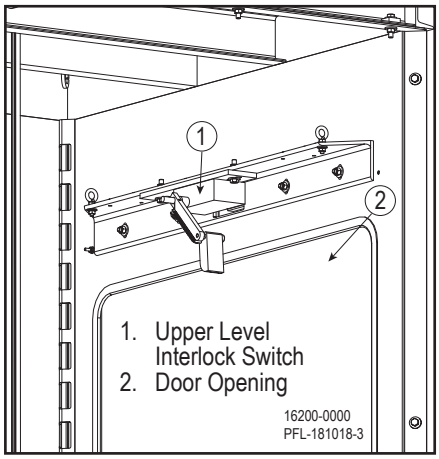
Push-Button Station
Figure 13-1



Control Panel Example
Figure 13-2



Drive Shaft
Figure 13-3

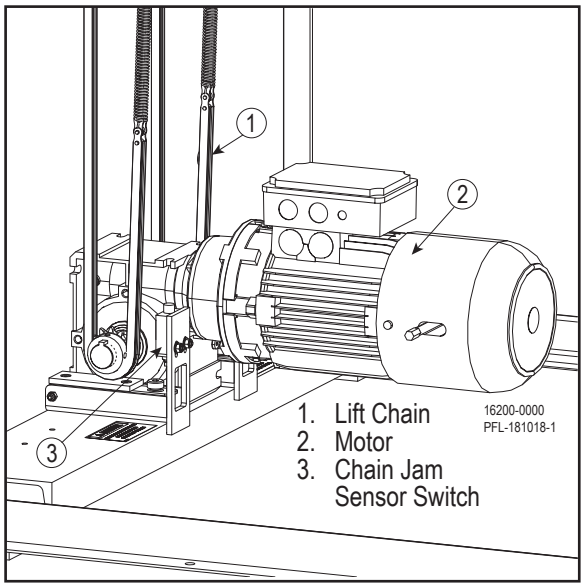


Upper Level Interlock Switch
Figure 13-4

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Sequence (continued)

5. The carriage overtravel limit switch is a safety device mounted above the uppermost floor level limit switch. In the event the uppermost level floor level limit switch fails to actuate, the overtravel limit switch is activated when it comes into contact with the carriage. When the overtravel limit switch is activated, the motor circuit is opened, the motor stops rotating, and the motor brake sets. This stops and holds the carriage position.
6. The chain jam sensor switch is mounted at the bottom of the lift. If the lift chain becomes jammed, the chain jam sensor switch is activated, the motor circuit is opened, the motor stops rotating, and the motor brake sets. This stops and holds the carriage position. The VRC will not operate until the lift chain is repaired and the chain jam sensor is readjusted. See Figure 13-5.

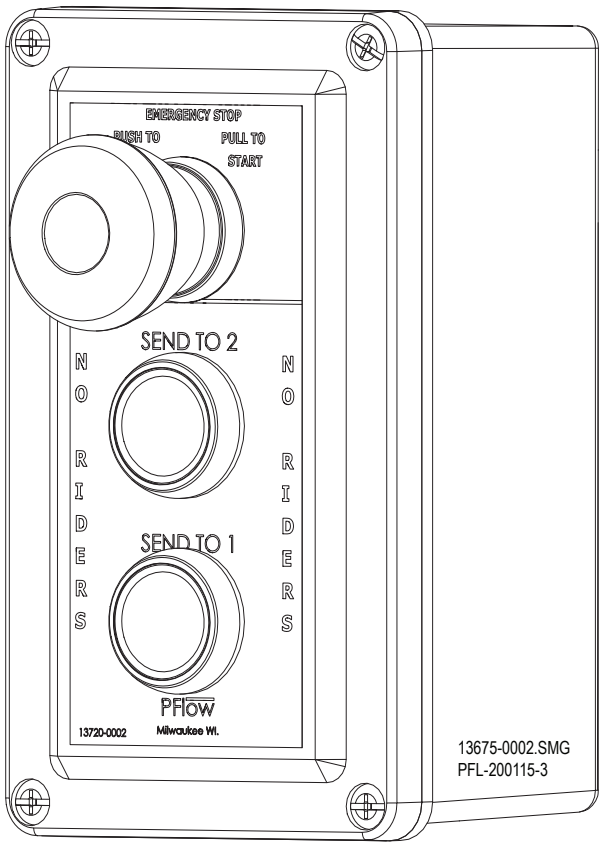


Chain Tensioner Limit Switch
Figure 13-5

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

To Operate the Lift

1. Close all doors.
2. Press the desired floor level button on the push-button station to move the carriage to the desired floor. The carriage will stop when the appropriate level is reached.
3. When the carriage arrives at the appropriate level and comes to a complete stop, open the door.
4. If an emergency occurs while the carriage is moving, push the emergency stop (E-stop) button. The button will keep the lift inoperable until the button is pulled out. See Figure 13-6.



Push-Button Station
Figure 13-6

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

Read this entire manual.

This section is provided for the assistance of qualified and trained service technicians only and is not intended for use by untrained or unauthorized service personnel. This section is not a replacement for the NORD Drivesystems instructions. Additional resources and information can be found at www.nord.com under the documentation tab.

NOTICE

A qualified person is defined as a person who, by possession of a recognized degree or certificate of professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve problems relating to the subject matter and work.

Personnel to carry out work on the brake must exclusively be qualified personnel who - based upon their education, experience, instructions as well as knowledge concerning relevant standards and provisions, accident prevention, regulations and operating conditions - have been authorized by the person being responsible for safety, to carry out the activities described in these instructions and who - when doing so - are in a position to recognize possible risks early and to avoid them.

Important Safety Information

DANGER

High Voltage! Installation or maintenance work may only be performed when no power is available to the motor. Electric motors, electrical brakes, and variable frequency drives contain potentially dangerous high-voltage. Shut down the power at the circuit breaker or power switch. Employees servicing or maintaining VRCs may be exposed to death or serious personal injury if hazardous energy is not properly controlled. De-energize any circuit before work is begun. Follow your facilities procedures or OSHA lockout/tagout (LOTO) procedures anytime maintenance or service is being performed on any electrical box or component.

Burn Hazard! Surfaces of motors and gear units may become hot during operation or shortly after start-up. In some instances additional protection against accidental contact may be necessary. Use caution to avoid burns or serious injury!

- Keep clear of unsupported platforms. Stay out of the area under a raised platform. If a maintenance operation requires the carriage to remain in the raised position, refer to Bulletin 15709-0083 for additional information or contact PFlow Industries, Inc. Customer Support Department for assistance.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Terms

Working brake	Brake which implements friction work in regular operation, i.e. performs a braking function
Brake	Spring-set brake = electrically released spring-set brake
Data sheet	Technical data sheet
Holding brake	Brake which does not perform friction work during regular operation but holds the load in position. In case of an emergency, however, it may also perform a braking function.
End plate	Motor end plate = end plate of an electric motor
Shaft	Motor shaft = shaft of an electric motor

Environment

Friction surfaces and the friction lining should not under any circumstances be in contact with oil or grease since small quantities reduce the braking torque considerably!

The standard motor is designed to operate in dusty or moist environments and have anti-fungal, thermal class F insulation.

Enclosure Protection Rating = IP55 (minimum)

Maximum Installation Height = 3,300 ft (1000 m)

General Operating Conditions:
Operating time: 100%
Ambient temperature: -20°C to +40°C (-4°F to 104°F)

Should any of the above parameters be exceeded contact the PFlow Industries, Inc. Customer Support Department for advice.

Ambient Temperature

- The “Ambient Temperature” is intended to be an operation guideline based upon the typical properties of the lubricant. The viscosity and other properties of the lubricant change based upon load, speed, ambient conditions, and reducer operating temperatures. The user should consult with their lubrication supplier before considering changes in oil type or viscosity.
- To prevent reducer overheating, observe the maximum operating oil temperature limits:
  Synthetic Oil: 105°C (220°F)

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Labeling

The lettering of the brake includes important data. This data and the contractual provisions for the brakes establish the limits of use.

Lettering on the brake housing:

103V 12 09 40

- 40 — Braking torque in Nm
- 09 — Year of manufacture
- 12 — Month of manufacture
- 103V — Operating voltage (DC) in Volt

Type Code

FDB 15 N H F R T S M 20 H7 24 VDC

- 24 VDC — Operating voltage
- H7 — Hub bore
- M — Micro switch
- S — Dust guard ring
- T — Tapped bores for encoder mounting[1)]
- R — Friction plate
- F — Flange
- H — Manual release without code: Operating noise-damped
- N — Brake type: N = standard; C = adjustable
- 15 — Brake size (08, 10, 13, 15, 17, 20, 23, 26, 30, 40)
- FDB — Brake designation (series)

*Option II** — S (Micro switch)

*Options I*** — T (Dust guard ring), R (Tapped bores for encoder mounting[1)]), F (Friction plate), H (Flange), N (Manual release without code: Operating noise-damped)

[1)] only available on Design **N**

* Options I must be requested at the time of order (e.g., by using the code)

** Option II is the only option for the **FDB** series. This option, if required, must be indicated at the time of order and is not retrofittable. Instructions for the micro switch must be observed.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Reducer Nameplate

1. Model/Type
2. Serial Number
3. Gear Ratio
4. Service Factor
5. Torque Rating
6. Output Speed RPM
7. Mounting Position

NOTICE

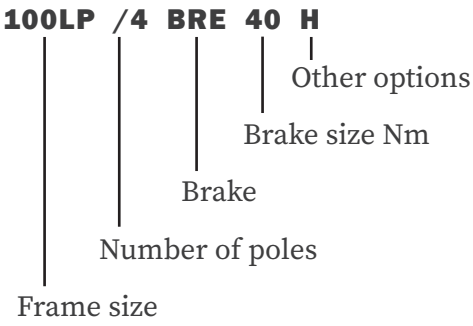
Observe the data on all reducer nameplates and verify published ratings for the NORD item(s) in question. Do not operate any NORD equipment outside the published performance range. Failure to comply may result in damage to the drive unit, driven machine, or the environment.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Motor Options and Nomenclature

PFlow Industries, Inc. offers many options for its motors. The option code will be shown in the motor nomenclature.

Lettering on the motor housing:



Motor Option Codes

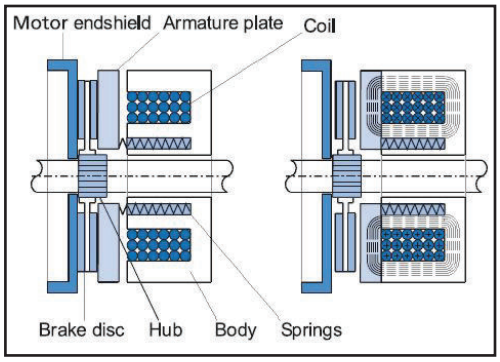
AICM	Additional Internal Insulation Coating Applied	OL	TENV Motor – Without Fan / With Cover
BRE	With Brake	OL/H	TENV Motor - Without Fan & Cover
EAR	Single Phase, Start Cap/Run Cap	P	Premium Efficient Motors
ECR	Single Phase, Start Cap/Run Cap Increased SF	RD	Canopy Cover
EHB	Single Phase, Run Capacitor Only	RDD	Double Canopy Cover
EP	Epoxy Dipped Windings	RG	Brake – Corrosion Protected
F	Blower Cooling Fan - 3ph and 1ph	RLS	Backstop
FC	Blower Cooling Fan - 1ph	SH	Motor Space Heater
FHL	Brake – Lockable Manual Release	SR	Brake – Dust Protected
H	Energy Efficient	TF	Thermistor
HL	Brake – Manual Hand Release	TW	Thermostat
IG	Incremental Encoder	VN	10:1 Constant Torque Rated Motor
IP66	IP66 Environmental Protection	VR	5:1 Constant Torque Rated Motor
IR	Brake – Current Sensing Relay	VW	20:1 Constant Torque Rated Motor
KB	Condensation Holes - Removable Plugs	VZ-F	1000+:1 Constant Torque Rated Motor
KD	Condensation Holes - Open	WE	2nd Motor Shaft End
MIK	Brake – Microswitch	WU	High Slip Rotor
MS	Power Plug Connector	Z	High Inertia Motor Fan

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Operation of the Brake

The standard motor brake is "spring-set". When power is removed and the brake is de-energized (power-off), the brake springs exert a force against the armature plate in turn preventing the brake rotor (or brake disc) from rotating.

When the brake coil is energized (power-on), a magnetic field builds and pulls the armature plate across the air gap to the brake casing, which releases the brake rotor and allows the motor shaft to rotate. The brake air-gap is factory-set but can be adjusted in the event of wear. See Figure 14-1.



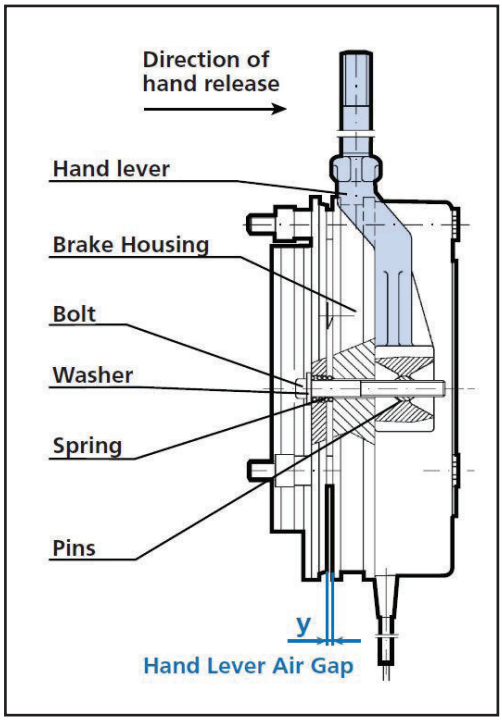
Brake Operation (Sectional View)
Figure 14-1

Hand Release Lever

⚠CAUTION

Carriage drop hazard! For safety reasons, the adjustment of the manual release must not be changed!

The brake is supplied with a hand release lever assembly. The hand release lever allows the brake to be manually released without requiring that the brake be energized with voltage. The lever has a spring return that allows the brake to be hand released and returned automatically to its set position. The handle of the hand release lever can be unscrewed for easy removal. See Figure 14-2.



Hand Lever (Sectional View)
Figure 14-2

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Brake Inspection

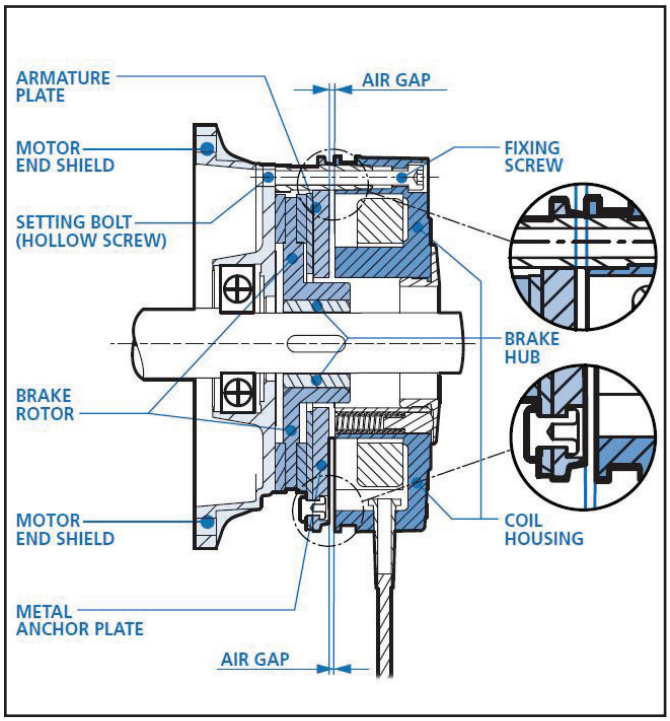
The spring-loaded brake is virtually maintenance free. However, when the maximum air gap is reached, an adjustment of the air gap is required for the safe operation of the brake. The functional capability and safety function of the brake will be compromised as additional wear occurs and must be replaced. The air gap must be verified in accordance with the following schedule.

Inspection intervals:

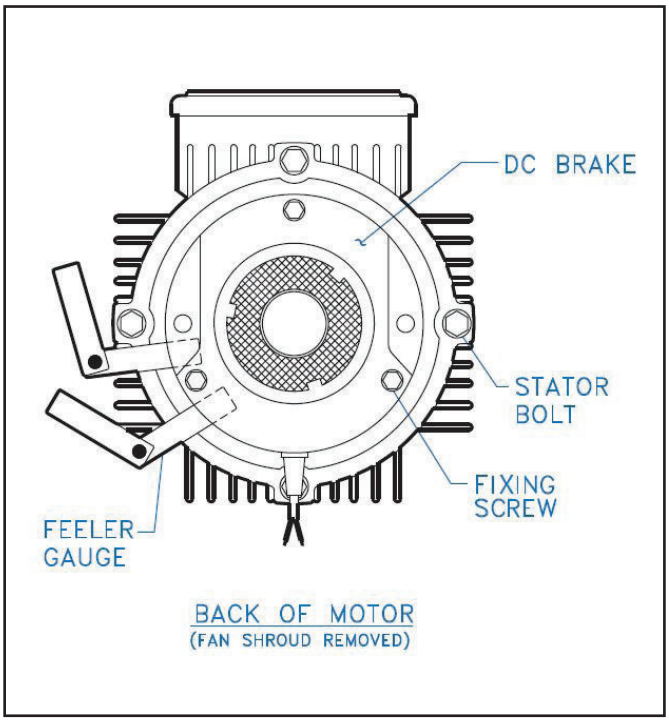
Working brake: After every 500 operating hours
According to specifications made by the customer

Holding brake: At least every two years
According to specifications made by the customer
Use shorter intervals in case of frequent emergency stops

The brake air gap is verified by placing a feeler gage between the metal anchor plate and the brake coil housing. See Figure 14-3 and Figure 14-4.



Air Gap Location Figure 14-3



Feeler Gauge Location Figure 14-4

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Adjust the Air Gap

1. Loosen the fixing screws that attach the brake to the motor's end-shield by approximately half a turn. The brake assembly may be further loosened by turning the setting bolts or hollow screws counter-clockwise into the brake coil housing.
2. The desired nominal air-gap for each brake size is:

Brake Size	Fixing Screw Tightening Torque		Nominal Air Gap Setting		Maximum Air Gap	
	[lb-ft]	[Nm]	[in]	[mm]	[in]	[mm]
BRE 5	2.2	3	0.008	0.2	0.024	0.6
BRE 10	4.4	6	0.008	0.2	0.028	0.7
BRE 20	7.4	10	0.012	0.3	0.031	0.8
BRE 40	7.4	10	0.012	0.3	0.035	0.9

3. In the course of making adjustments, the air gap measurement must be verified in several places using a feeler gauge. The feeler gauge should be positioned between the armature plate and the brake coil housing.
4. ***Decreasing the Air Gap*** – To decrease the air gap, turn the setting bolts or hollow screws counter-clockwise while securing the fixing screws; alternatively, turn the fixing screws clockwise while securing the setting bolts or hollow-screws.
   Increasing the Air Gap – To increase the air gap, turn the setting bolts or hollow screws clockwise while securing the fixing screws; alternatively, turn the fixing screws counter-clockwise, while securing the setting bolts or hollow screws.
5. Re-tighten the fixing screws to the proper torque.
6. Re-verify the air gap in several places and repeat steps 1-5 as needed until the air gap spacing is uniform and consistent at ***three different positions around the brake***.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Troubleshooting the Brake

The following table identifies some of the most common issues with brake, the possible causes, and the suggested solution.

Malfunction	Possible Cause	Solution
Brake doesn't release	Air gap is too large.	Inspect the air gap and adjust.
	Brake not receiving electrical power.	Verify the electrical connection.
	Failed rectifier.	Replace the rectifier.
	Brake is getting too warm.	Use fast response (FR) rectifier.
	Voltage to brake coil is too small.	Verify the connection voltage of the brake coil.
	Rectifier supply voltage from inverter.	Rectifier voltage must be from a separate source. (Inverter output voltage varies)
Brake release is delayed	Air gap is too large.	Inspect the air gap and adjust.
	Voltage to brake coil is too small.	Verify the connection voltage of the brake coil.
Brake does not engage	Voltage to coil is too large	Verify the connection voltages of the brake windings.
	Hand release is adjusted incorrectly.	Adjust to the correct air gap.
	Anchor plate is mechanically blocked.	Remove blockage.
Brake engagement is delayed	Voltage to coil is too large.	Verify the connection voltages of the brake windings.
	Brake is switched to AC side.	Use DC switching.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Removing the Brake

The brake can only be removed after power has been disconnected from the VRC, the brake and motor has been de-energized, and the brake is torque-free.

DANGER

High Voltage! Employees servicing or maintaining VRCs may be exposed to death or serious personal injury if hazardous energy is not properly controlled. De-energize any circuit before work is begun. Follow your facilities procedures or OSHA lockout/tagout (LOTO) procedures anytime maintenance or service is being performed on any electrical box or component.

Disposal of the Brake and Gear Motor

Because of the different material components, the components of our spring-applied brakes and gear motors must be disposed of and recycled separately. Follow official regulations. Important AAV (List of Wastes Ordinance) key numbers are indicated below. Depending on the material connection and the kind of separation, other key numbers may apply to components made of such materials.

- Ferrous metals (key number 160117)
- Non-ferrous metals (key number 160118)
- Brake linings (key number 160112)
- Plastics (key number 160119

Components	Material
Gear wheels, shafts, rolling bearing, parallel keys, snap rings, spacers, shims, etc.	Steel
Gear housing and housing components	Cast iron or Aluminum (depending on type and size)
Worm gears	Bronze alloy
Radial seals, sealing caps, and rubber components	Elastomers with some steel
Coupling components	Plastic or Elastomer with steel
Housing gaskets and flat oil seals	Asbestos-free sealing or gasket material (various types used)
Gear Oil	Food-Grade Food-Grade Synthetic Polyalphaolefin Food-Grade Synthetic Polyglycol

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Brake Pad Replacement

When the brake pad is worn the pad should be replaced to maintain proper brake operation and ensure safety.

Required Tools

- Phillips head screw drivers (fan shroud removal)
- External snap ring pliers (fan and brake hub removal)
- Large flat head screw driver or small pry bar (fan removal)
- Metric T-handle wrenches and open-end wrenches

Replacement Procedure

1. Remove the fixing screws securing the fan cover to the motor end-shield. If the brake has a hand release, the lever arm should be removed by unscrewing it.
2. Remove the fan cover and note the position of the hand release slot if applicable.
3. Remove the snap ring holding the cooling fan and carefully remove the cooling fan, key and second snap ring.
4. If the brake is equipped with a dust boot, remove it.
5. Remove the socket head cap screws holding the brake coil to the motor end-shield.
6. Remove the brake coil, noting the hand release and power cable locations.
7. Slide the brake rotor off the brake hub which is secured to the motor shaft.
8. Clean the brake, install the new brake rotor pad, and reassemble the brake in reverse order of the steps outlined.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Troubleshooting the Reducer

The following table identifies some of the most common issues with speed reducers, the possible causes, and the suggested solution.

Malfunction	Possible Cause	Solution
Runs hot - Overloading	Load exceeds the capacity of the reducer.	Verify the rated capacity of the reducer and replace with unit with a larger capacity or reduce the load.
Runs hot - Improper lubrication	Insufficient lubrication.	Inspect lubricant level and adjust up to recommended levels.
	Excessive lubrication.	Inspect lubricant level and adjust down to recommended levels.
	Wrong lubrication.	Flush out and refill with correct lubricant as recommended.
Runs noisy - Loose foundation bolts	Weak mounting structure.	Inspect the mounting of the reducer. Tighten loose bolts and/or reinforce mounting and structure.
	Loose hold down bolts.	Tighten bolts.
Runs noisy - Failure of bearings	Lack of lubricant.	Replace the bearing. Clean and flush the reducer and fill with the recommended lubricant.
	Overload.	Verify the rated capacity of the reducer.
Runs noisy - Insufficient lubricant	Level of lubricant in reducer not properly maintained.	Verify the lubricant level and adjust to factory recommended level.
Output shaft does not turn - Internal parts are broken or missing	Overloading of reducer can cause damage.	Replace broken parts. Verify the rated capacity of the reducer.
	Key missing or sheared off on input shaft.	Replace key.
	Coupling loose or disconnected.	Properly align the reducer and coupling. Tighten the coupling.
Oil leakage - Worn seals	Caused by dirt or grit entering the seal.	Replace seals. Autovent may be clogged. Replace or clean the Autovent.
Oil leakage - Unit runs hot or leaks	Overfilled reducer.	Inspect the lubricant level and adjust to the recommended level.
	Vent clogged.	Clean or replace, making sure to prevent any dirt from falling into the reducer.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

⚠WARNING

- Do not use any corrosive or flammable solvents or cleaning agents on the machine that contain TRI, PER, TETRA, or FCHC. Read the instructions on the packaging when use is made of chemical substances (cleaning agents).
- Electrical components should not make contact with water or other liquids.
- Do not clean the VRC or any of its components with compressed air or water under high pressure.
- Do not use abrasive steel pads, wire brushes, or scrapers when cleaning.
- Avoid parts made of rubber or plastic, such as cables and gaskets, from making contact with oil, solvents, or other chemicals.

- Climbing, sitting, walking, or riding on equipment while the equipment is in operation could result in death or serious injury.
- Close all gates before the carriage is moved. Never leave the VRC unattended with the gates in the open position. Never close gates when a person is on the carriage or within the fenced area.

- The most common reason for access to the area beneath the carriage is to remove debris from the pit. This is best accomplished using a long handled broom or rake to avoid entering the pit under the raised carriage deck. Only qualified person following proper lockout/tagout procedures with the carriage properly secured in a raised position are permitted to access the pit or hoistway enclosure at the bottom level. Refer to Bulletin 15709-0083 for additional information.

- Entanglement hazard! Secure long hair, wear snug-fitting clothing, and avoid wearing jewelry while using the VRC.

Cleaning

1. Remove all product from the VRC carriage.
2. Lockout the VRC in accordance with the facility Lockout/Tagout program.
3. Remove spills and dirt by hand.
4. Refer to Bulletin 15709-0083 for additional information on procedures to access the area beneath the carriage to remove debris from beneath the carriage.
5. Report any unsafe condition or damage to the personnel responsible for the VRC and make sure that any damage is remedied before restarting the VRC. Do not allow the VRC to operate when unsafe conditions arise.

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

The VRC requires minimal attention on a regular basis to prevent equipment failures or accelerated wear and tear. This section is provided for the assistance of qualified and trained service technicians only and is not intended for use by untrained or unauthorized service personnel. Make sure all steps are completed. A record of regular, properly conducted preventive maintenance provides a running history of any issues the VRC may have. The reports will identify trends, and helps anticipate expected wear and tear repairs. Sign and return to PFlow Industries, Inc. Customer Support Department via e-mail to csd@pflow.com

NOTICE

A qualified person is defined as a person who, by possession of a recognized degree or certificate of professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve problems relating to the subject matter and work.

⚠WARNING

- If any defects relating to operating safety and reliability are detected or if any damage occurs, the VRC must be taken out of operation immediately.

- Lockout/tagout the VRC before performing maintenance. De-energize any circuit before work is begun.
- Take appropriate measures for safely working at heights.

- Make sure that no persons or objects are within the range of any moving parts of the VRC.

- Climbing, sitting, walking, or riding on equipment while the equipment is in operation could result in death or serious injury.
- If this VRC needs to be modified in any way, contact PFlow Industries, Inc. for assistance. Do not make any unauthorized changes.
- Before the VRC is put into operation, all parts must comply with all relevant health and safety directives and regulations.

- Falling Hazard! Close all doors before the carriage is moved. Never leave the VRC unattended with the doors in the open position. Never close doors when a person is on or below the carriage.

- Entanglement hazard! Secure long hair, wear snug-fitting clothing, and avoid wearing jewelry while using the VRC.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

√	Action	How Often
	Inspect the VRC for any obvious structural damage.	6 months
	Verify overall operation.	6 months
	Verify that all level stops are at the floor level. Adjust as necessary.	6 months
	Verify that all areas under, around, and inside the VRC are clean.	6 months
	Verify that all doors and interlocks are undamaged and functioning properly.	6 months
	Verify that all electrical components are undamaged.	6 months
	Verify that all push-button stations and Emergency Stops (e-stops) are functioning on each level.	6 months
	Identify any unsafe condition. Document and report the condition immediately to the customer and then PFlow Industries, Inc. Customer Support Department. Do not allow the VRC to operate when unsafe conditions arise.	6 months
	Verify that all nuts and bolts are tight. Adjust as necessary.	6 months
	Verify that all moving components are functioning properly.	6 months
	Inspect all chains for wear, rust, bent, cracked, or binding links.	6 months
	Inspect and lubricate all chain as needed with non-detergent, petroleum-based SAE 30 oil. Chain is located above the load. Avoid drips. Inspect for wear, rust, bent, cracked, or binding links.	6 months
	Inspect safety pins for free movement. Loosen turnbuckles to verify engagement. Lubricate turnbuckle threads with non-detergent, petroleum-based SAE 30 oil. Retighten turnbuckles before operating.	6 months
	Inspect the carriage roller assembly for rotation interference and wear.	6 months
	Verify that the overtravel switch is undamaged and functioning properly.	6 months
	Verify that all electrical connections are tight.	6 months
	Verify that all tensioners are properly adjusted. Adjust as necessary.	6 months
	Inspect all welding, bracing, and anchoring for structural integrity.	6 months
	Inspect the lift chain sprockets for wear.	6 months
	Grease the pillow block bearings on the lift chain sprocket with lithium axle grease.	6 months
	Apply Loctite® Blue 242® to the setscrews on the pillow block bearings and the drive sprockets. Tighten and torque all setscrews.	6 months
	Inspect the gear reducer oil level and replenish as necessary. The minimum acceptable oil level is 0.15" (4mm) below the oil level hole.	6 months
	Inspect the motor and brake. Measure and record the air gap on the brake.	12 months
	Replace gear reducer mineral oil every 10,000 operating hours or every two years.	2 years

Customer signature:	Date work completed:
Name/Phone:	Authorized Technician(s):
Title:	Name:
E-mail:	Name:

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

Read this entire manual before any troubleshooting and service is attempted on the Vertical Reciprocating Conveyor (VRC).

Service must be performed only by qualified and trained service technicians familiar with the safe operation of this equipment.

NOTICE

A qualified person is defined as a person who, by possession of a recognized degree or certificate of professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve problems relating to the subject matter and work.

Personnel to carry out work on the VRC must exclusively be qualified personnel who - based upon their education, experience, instructions as well as knowledge concerning relevant standards and provisions, accident prevention, regulations and operating conditions - have been authorized by the person being responsible for safety, to carry out the activities described in these instructions and who - when doing so - are in a position to recognize possible risks early and to avoid them.

⚠DANGER

- High Voltage! A qualified electrician must install all electrical connections and permanent wiring in accordance with applicable local or national electrical codes. Make sure the equipment is properly grounded in accordance with local electrical codes or, in the absence of local codes, with the current edition of the National Electrical Code NFPA No. 70.
- Keep clear of unsupported platforms. Stay out of the area under a raised platform. If a maintenance operation requires the carriage to remain in the raised position, use a means of support such as adequately sized maintenance chains, or straps with shackles around the top of the carriage frame that are capable of supporting the weight of the carriage. Refer to Bulletin 15709-0083 for additional information.

⚠WARNING

- Assess the VRC and identify any potential load jambs.
- Lockout/tagout equipment before performing any adjustments or maintenance. If the equipment is not locked out, it could start unexpectedly and cause injury or damage. ***Make sure all personnel are aware of the potential for stored energy to be present even after the power has been locked out.*** Refer to ANSI Z244.1 and OSHA 29 CFR 1910.147 for minimum requirements for a lockout/tagout system. There may be additional country, state, or local requirements.
- Toppling Hazard! Secure all VRC components (e.g., lift chain) that may fall during the troubleshooting process.

- Falling Hazard! Secure all VRC access areas (e.g., doors, push-button stations) before any troubleshooting or service is begun. Never leave the VRC unattended with the doors in the open position. Never close doors when a person is on or below the carriage.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

The following table identifies some of the most common issues with the VRC, the possible causes, and the suggested solution.

Malfunction	Possible Cause	Solution
Push-button controls do not start the motor.	The emergency stop is pushed in.	Pull the emergency stop out.
	Doors are open or ajar.	Verify that all doors are closed.
	Main power disconnect is off.	Verify that there is a reason the power is off before turning the power on.
	Thermal overload has tripped.	Press the reset button. If it trips again, determine the cause. The motor is overheating.
	Control fuse is blown.	Investigate if the problem is related to the main power fuses or the control fuses. Correct the problem and replace the fuse.
	Power circuit between the disconnect and starter is dead.	Using a voltmeter, measure the voltage. Repair as needed.
	Loose lift chain or tension springs.	Tighten the chain or adjust the tension springs using the adjustment bolts.
	Broken or jammed chain.	Repair or replace as needed.
Motor starts and carriage raises, but motor stops before the second level.	Doors are open or ajar.	Close the door. Inspect the door magnets and interlock. Adjust as needed.
	Object encountered.	Identify the problem. Remove or repair as needed.
	Drive component interference.	Remove object. Repair if needed.
	OCS relay has tripped.	Lower and remove excessive weight. Inspect brake for possible malfunction, excessive ambient temperature, or mechanical binding.
	Loose or broken lift chain.	Tighten or repair the chain as needed.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Malfunction	Possible Cause	Solution
Lift motor starts for two seconds and stops.	Overcurrent sensor or motor overload trips.	Lighten the lifted load.
Carriage fails to stop at floor level.	Floor level limit switch is inoperable.	Adjust, repair, or replace the floor level limit switch.
	Brake inoperable.	Determine cause and effect. Repair if needed.
Carriage raises but will not lower.	Safety pins have set.	Identify the problem and repair as needed.
Carriage lowers but stops early.	Debris below the carriage.	Remove debris and clean the area.
Rough or noisy operation.	Motor / reducer.	Determine the cause and correct.
	Travel interference.	Identify the problem, remove, and repair as needed.
	Drive component interference.	Identify the problem, remove, and repair as needed.
	Guide rollers are worn.	Inspect and replace as needed. Determine the cause and correct.
	Chain idler sprocket is worn or corroded.	Inspect and replace as needed.
Motor hums but shaft does not rotate, then thermal overload trips.	Single phasing.	Use a voltmeter to ensure the incoming main leads are wired properly. Repair as needed.

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

This recommended spare parts list is generic (not specific to your unit). Part numbers are subject to variables specific to each application. This list is a guide to assist the customer in establishing an emergency inventory for your PFlow Industries, Inc. VRC. Convenience and minimal down time are two good reasons to maintain an inventory of spare parts. This list does not imply that any part is subject to failure. However, should any of these parts fail, the VRC could be out of service.

Description	Quantity	Part Number
Wheelblocks		
Carriage Roller, UHMW	4	
Door Latching Mechanism		
Keeper, GAL, Modified	2	
Block, Limit Switch	2	
Shoulder Bolt, 3/8 x 1-1/2	2	
Pin, Roll, 3/16 x 2 LG	2	
Arm, Limit Switch	2	
Spring, Extension HK Ends	2	
Push-Button Stations		
PB Station, 2-LVL, 22mm	1	
Emergency Stop (E-Stop)	1	
Operator Push-Button Black Flush	1	
General		
Paint 13 oz. PFlow Blue Aerosol Spray	1	
Electrical		
Fuse, 0.8A, 600V, Class CC, Time Delay	5	
Fuse, 4A, 250V, Time Delay	5	

Part numbers in this manual are subject to change or correction without notice. Minimum order charge is $35, FOB Milwaukee, Wisconsin. Components replaced under warranty will be charged for in accordance with our RMA procedures. PFlow Industries, Inc. Customer Support Department must issue an authorization in advance of any claim for warranty and/or warranty labor. This list is based on the job as manufactured and shipped new from PFlow Industries, Inc. Any changes, updates, parts by others, or modifications after shipment are unknown to PFlow Industries, Inc.

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

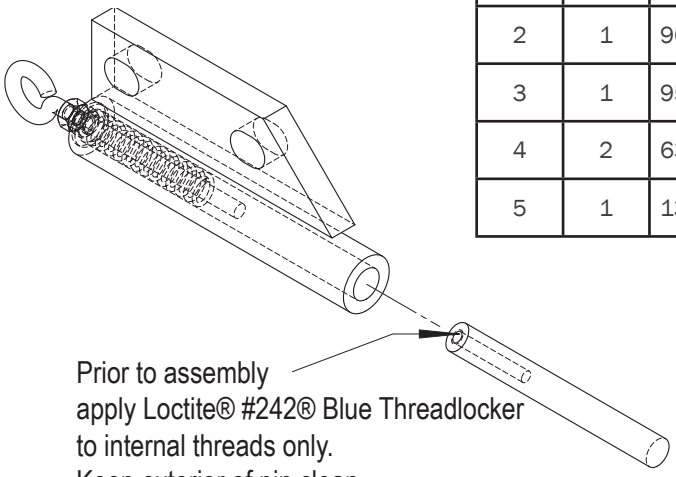
PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

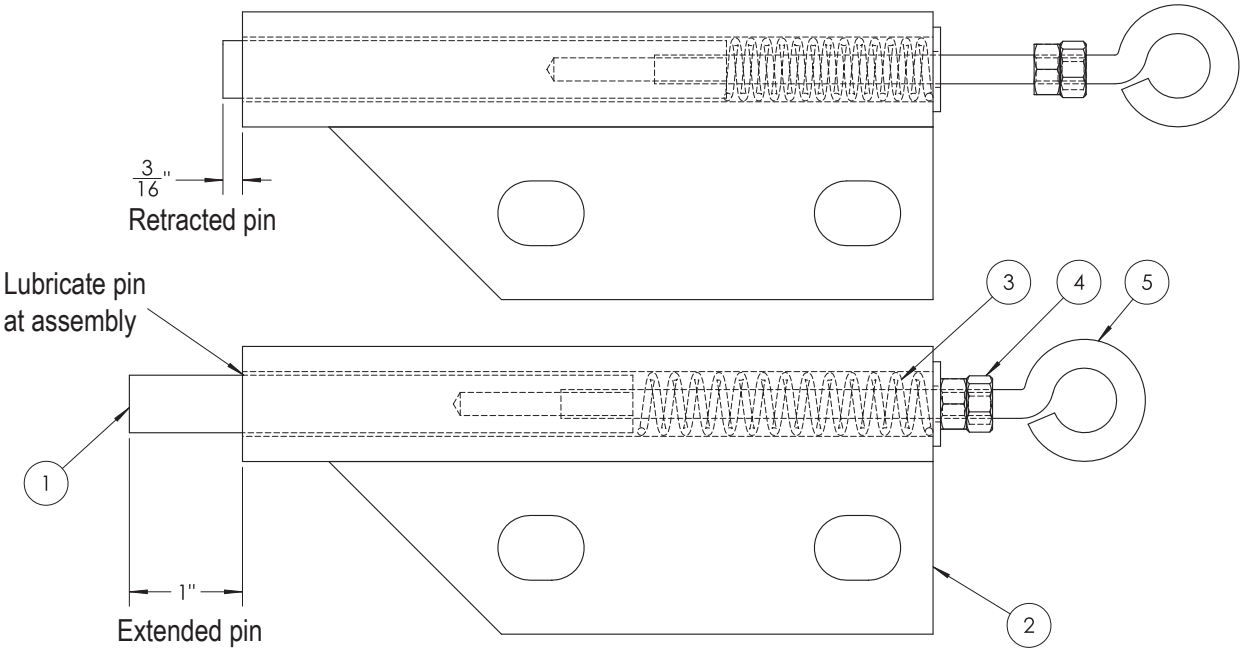
Part numbers in this manual are subject to change without notice. Components replaced under warranty will be charged for in accordance with our RMA procedures. Minimum order charge is $35, FOB Milwaukee, Wisconsin.

Safety Stop Pin Assembly 9644-0000

Item	Qty	Part No.	Description
1	1	9645-0000	Pin, Safety Stop
2	1	9646-0000	Pin, Safety Stop, Weldment
3	1	9521-0000	Spring, Compression, .48 OD
4	2	6358-0009	Nut, Hex, 1/4-20, GR2
5	1	13834-0064	Eyebolt, 1/4-20 x 4, Full



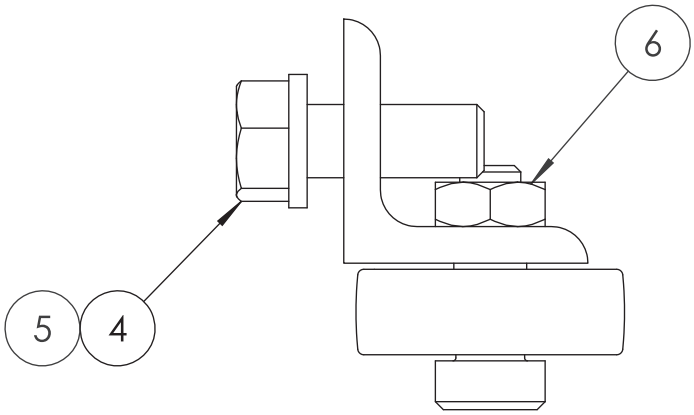
Prior to assembly
apply Loctite® #242® Blue Threadlocker
to internal threads only.
Keep exterior of pin clean.

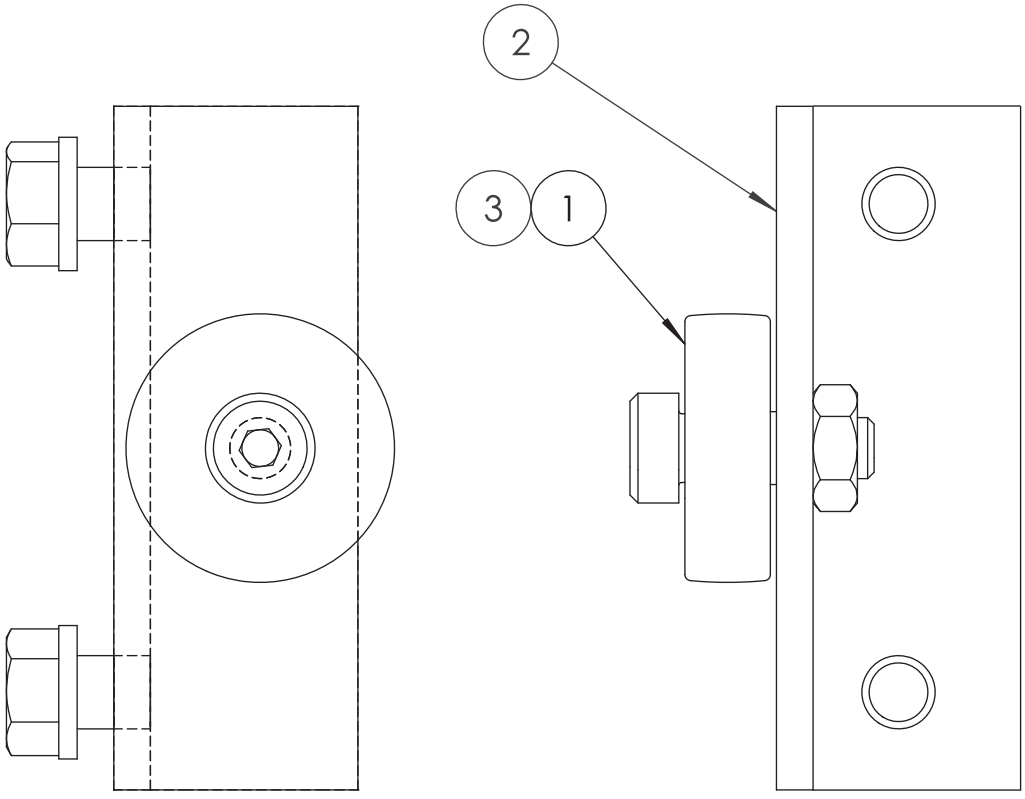


MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Roller Assembly
13293-1000-B

Item	Qty	Part No.	Description
1	1	13153-0000	Roller, Carriage, UHMW
2	1	13289-1000	Angle, Mounting
3	1	7018-0008	Bolt, Shoulder, 3/8 x 1/2
4	2	5927-0016	Screw, HHC, 3/8-16 x 1.0, GR2
5	2	5858-0011	Lock Washer, 3/8
6	1	8326-0011	Nut, Hex, Jam, 3/8-16

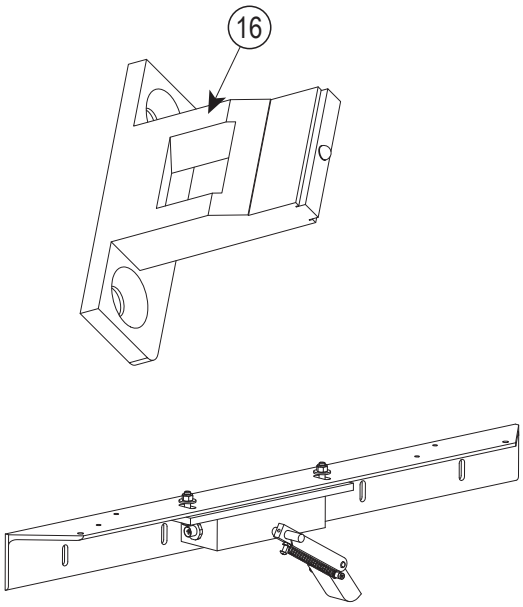




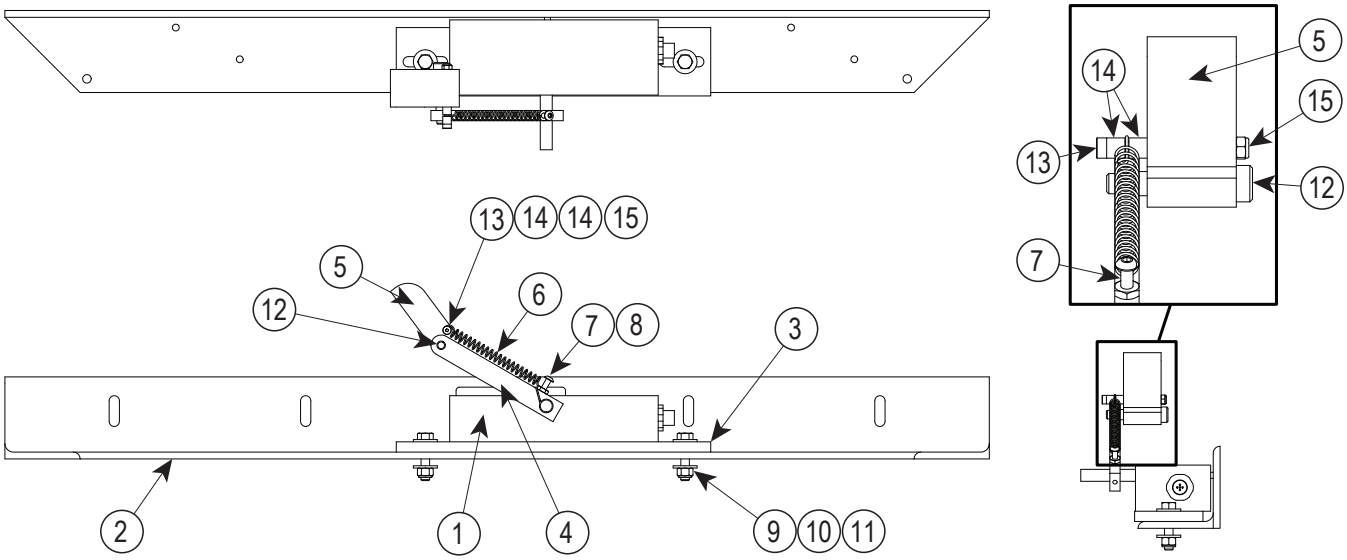
PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

GAL Interlock Assembly, Series B 13296-0000-C

The interlock is a device used to mechanically prevent the door from opening. Below is the GAL interlock supplied. As a safety device, replacement components are only available as shown below. Some configurations may vary by application.

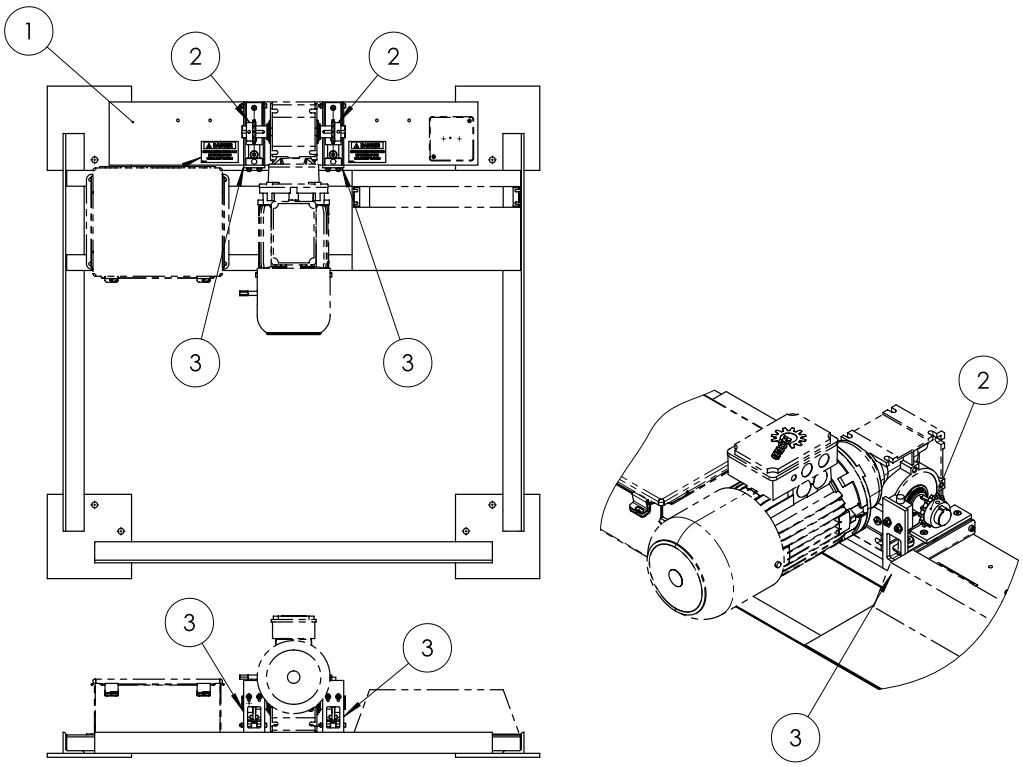


Item	Qty	Part No.	Description
1	1	2691-1100	Interlock, GAL, Type N, QD
2	1	13190-0000	Support, Keeper-Interlock
3	1	13294-0000	Mounting Plate, GAL
4	1	13226-0000	Arm, Limit Switch
5	1	13227-0000	Block, Limit Switch
6	1	13671-0000	Spring, Extension HK Ends
7	2	11827-0020	Screw, BHSC 10-32 x 1-1/4
8	1	6359-0007	Nut, Hex, #10-32, GR2
9	2	6846-0024	Screw, HHC, 5/16-18 x 1.5, GR2
10	4	6296-0010	Washer, Flat, STD 5/16
11	2	6708-0010	Nut, Lock, Nylon, 5/16-18
12	1	7018-0024	Shoulder Bolt, 3/8 x 1-1/2
13	1	20873-0032	Shoulder Bolt, 3/16 X 2
14	2	20874-0000	Spacer, Nylon, 5/16 OD X
15	1	6708-0006	Nut, Lock, Nylon, #8-32
16	1	8078-0013	Keeper



MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Lower Frame Assembly



Item	Qty	Part No.	Description
1	1	17248-0000**	Frame Lower, Weldment
	1	16613-3600**	Frame Lower, Weldment
2	2	13225-4013-18	Sprocket, 40B13, 1-1/8"
3	2	17057-0000	Assembly, Chain Guide

*** Appropriate weldment varies by application. Contact PFlow Industries, Inc. Customer Support Department for part number. VRC serial number is required.*

Miscellaneous

Item	Qty	Part No.	Description
	4	13197-0000	Sprocket, 40-18T with Bearings used in Upper Frame Assembly
	2	13673-0000	Link, Master #C2040 Chain
	2	13672-0001	Spring, Extension

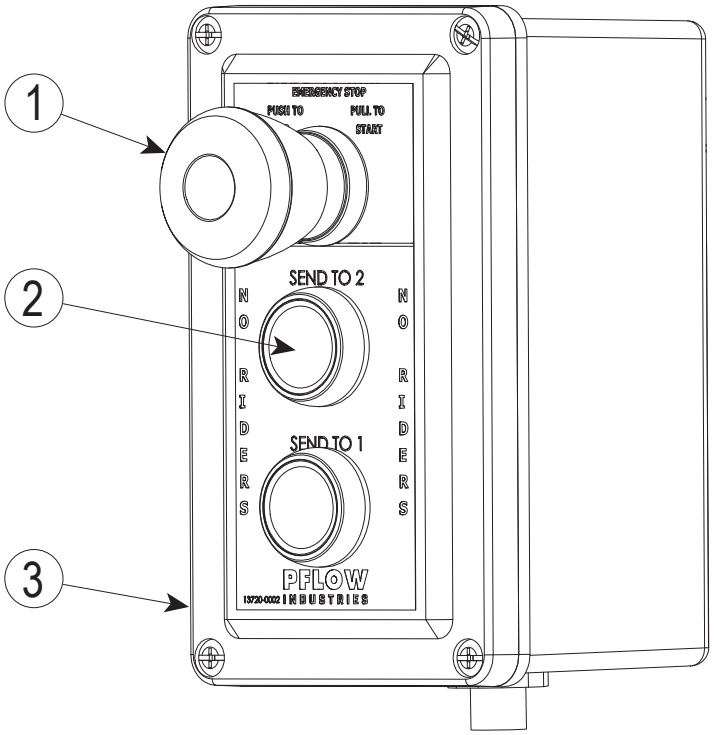
** Item not shown*

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Push-Button Station

Item	Qty	Part No.	Description
1	1	13692-0014	Emergency Stop, MHPB Red Push-Pull
2	2	13690-0003	Push-button, Flush, Black
3	1	13675-1002	Push-button Assembly, Quick Connect
*	1	15235-2006	Cable, M12 8-Pin, 6M
*	1	15235-2010	Cable, M12 8-Pin, 10M

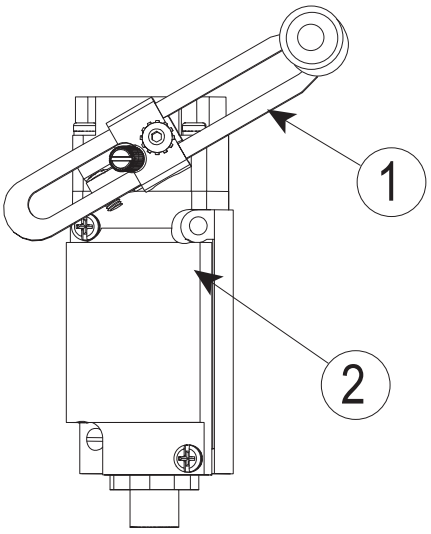
** Item not shown*



Limit Switch

Item	Qty	Part No.	Description
1	1	2891-0000	Arm, Limit Switch
2	2	2893-1000	Limit Switch, Quick Connect
*	1	15233-2002	Cable, M12 5-Pin, 2M
*	1	15233-2006	Cable, M12 5-Pin, 6M
*	1	15233-2010	Cable, M12 5-Pin, 10M

** Item not shown*



MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

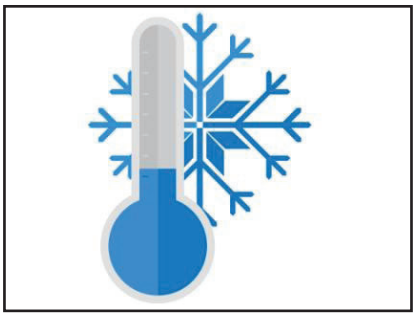
PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Environment

All components should be ***stored indoors***. The area of storage should be kept at a constant temperature above 55°F (13°C) and relative humidity of approximately 40%, free from heavy dust and contaminants.

NOTICE

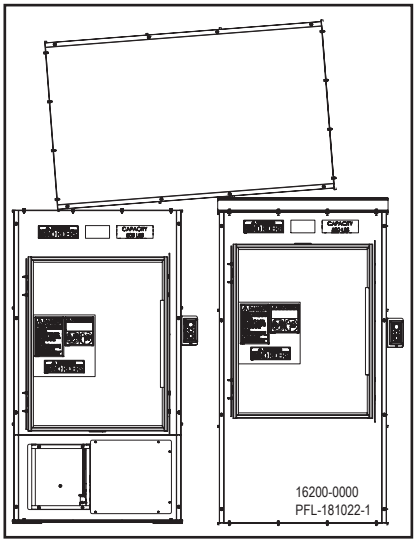
Outdoor storage is ***not*** recommended. Our warranty policy does not cover damage as a result of improper storage.



Avoid Cold Temperatures
Figure 20-1

Stacking

Except for placing the parts container and bracing on the empty carriage, stacking or leaning the various modules upon each other is strictly forbidden. Panels and doors will warp. See Figure 20-2.

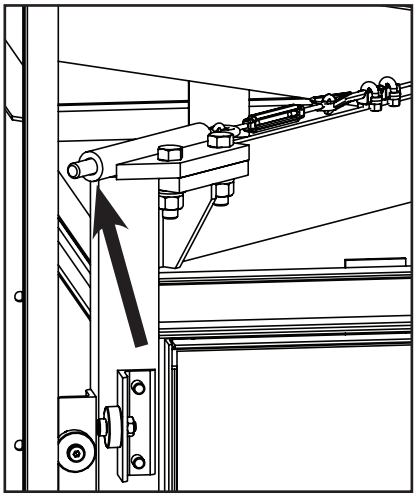


Do Not Stack Components
Figure 20-2

Long Term Storage

Storage for more than two months after shipment, will require that the following maintenance procedures be performed every sixty days from date of shipment:

1. If ***roller chains*** are stored for an extended period of time or in a corrosive environment, they must be dipped or stored in a non-detergent oil to retain their original condition.
2. Lightly coat the ***sprockets*** with a non-detergent oil to prevent corrosion.
3. Lubricate the shaft of the ***safety pins*** with a non-detergent oil. Loosen turnbuckles to verify that the safety pins move freely. See Figure 20-3.
4. Elevate the ***bottom module*** off the ground and cover with a tarp. Allow adequate ventilation to minimize condensation. Protect all exposed or unpainted shaft and flange surfaces with an anti-corrosion agent or grease. Store in a location free from shock and vibration, to avoid false brinelling of the bearing elements and raceways.



Lubricate Safety Pins
Figure 20-3

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Long Term Storage (continued)

⚠DANGER

High Voltage! Employees servicing or maintaining VRCs may be exposed to death or serious personal injury if hazardous energy is not properly controlled. Follow your facilities procedures or OSHA lockout/tagout (LOTO) procedures anytime maintenance or service is being performed on any electrical box or component. Only qualified and trained service technicians are to apply power to the motor.

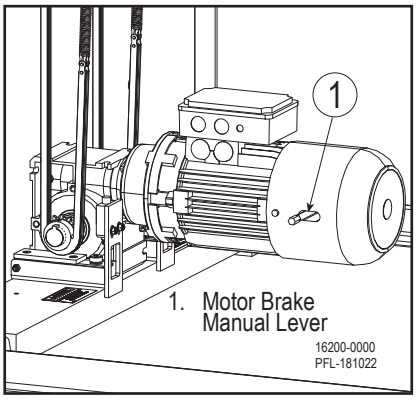
⚠CAUTION

The incoming voltage source must match the voltage identified on the rating tag. The rating tag provides essential technical information required for any installation, maintenance, or repairs. Do not remove, damage, or modify the rating tag.

NOTICE

A qualified person is defined as a person who, by possession of a recognized degree or certificate of professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve problems relating to the subject matter and work.

4. ***Apply power*** to the motor/brake with a start and stop switch using the correct voltage and correct brake wiring configuration. This will rotate the drive shaft and cycle the brake.
5. ***Manually cycle the brake*** several times using the manual lever on the side of the motor. See Figure 20-4.
6. Plug the ***electrical component*** inlets to prevent moisture and other contaminants from entering them. Store in a dry, temperature controlled location to prevent corrosion. Place silica gel desiccant inside the control enclosure. Inspect the inside of the control enclosure for any moisture build up. See Figure 20-5.
7. Make sure the ***parts carton*** remains sealed and dry.



Motor Components
Figure 20-4

Place Inside Control Enclosure
Figure 20-5

Storage for Longer than Six Months

For units stored longer than six months, it is recommended that you contact the PFlow Industries, Inc. Customer Support Department for additional information that may be available prior to starting up your unit.

Equipment Manuals

The VRC installation manual, electrical, and owner's manuals are located in the parts carton. Do not open the parts carton. If the manuals are required, contact the PFlow Industries, Inc. Customer Support Department for an electronic copy (.pdf).

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

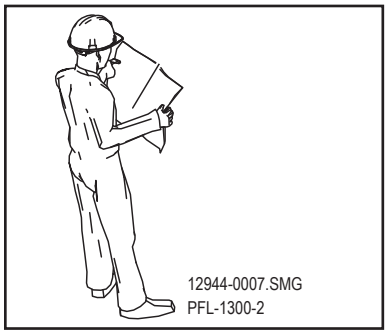
Before You Begin

Read this entire manual. Before starting the installation, verify the job site dimensions and the dimensions of the delivered materials against the PFlow Industries, Inc. General Arrangement (GA) drawing. If the site conditions or the delivered materials do not match the GA drawing, please consult the PFlow Industries, Inc. Customer Support Department.

⚠DANGER Falling equipment hazard! The installation of this equipment requires a qualified installer with extensive knowledge and experience on how to rig, erect, and support structural steel.

NOTICE A qualified person is defined as a person who, by possession of a recognized degree or certificate of professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve problems relating to the subject matter and work.

NOTICE It is critical that the foundation beneath the VRC be level from side to side and front to back. Correct any discrepancies.

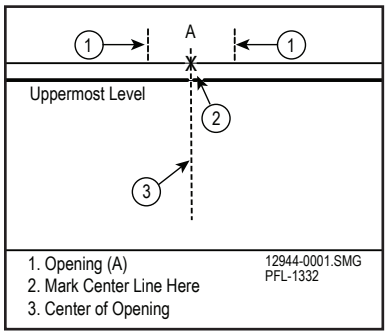


Verify Site Dimensions Figure 21-1

Verify Job Site Dimensions and Carriage Orientation

The Vertical Reciprocating Conveyor (VRC) was built using dimensions supplied to PFlow Industries, Inc. as listed on the General Arrangement drawing (e.g., floor-to-floor distance, upper level opening, etc.).

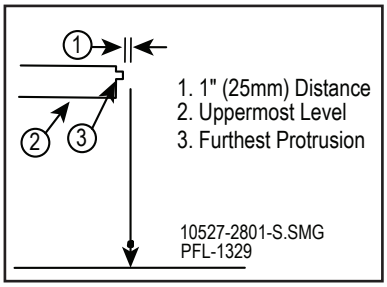
These instructions are representative of an open mezzanine installation in which the bottom module is placed in position before any additional module is placed in position.



Initial Layout Figure 21-2

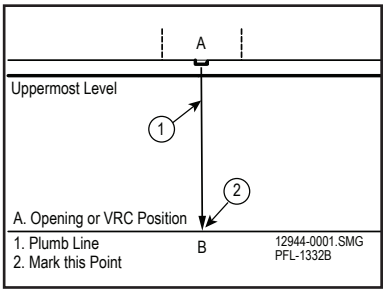
Mark Alignment

1. Verify that the first level module installation (e.g., no restricted shaftway, etc.) allows the carriage to be placed before additional modules are installed.
2. Mark the center line position of the opening at the uppermost level. See Figure 21-2.
3. To allow clearance for assembled modules, drop a plumb line from the uppermost level on the center line of the opening (Point A). The plumb line must be 1" (25mm) beyond the furthest protrusion. See Figure 21-3.
4. Clearly mark the tip of the plumb bob on the first floor. Point B is the center point of the carriage at the lower level. See Figure 21-4.



Floor-to-Floor Alignment Figure 21-3

NOTICE All protrusions from the floor, wall, or other areas must be removed. Plumb lines must be positioned 1" (25mm) beyond the furthest protrusion or the assembled modules will not clear the protrusion during assembly.



Mark Lower Floor Figure 21-4

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Mark Alignment (continued)

5. Drop two plumb lines from the uppermost level roughly 2' (1219mm) on each side of the center line. The plumb line must be 1" (25mm) beyond the furthest protrusion. See Figure 21-5.
6. Locate the three marks on the first floor. Snap a chalk line between C and D. See Figure 21-6.

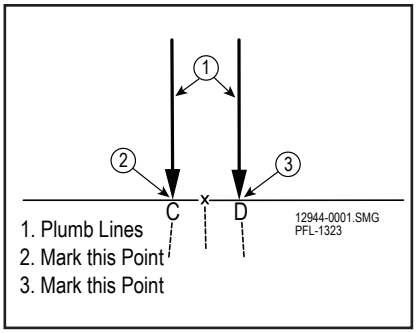
⚠CAUTION

To prevent personal injury or damaging the module, attach rigging only to the center plate weldment when lifting the module. Do not attach rigging to any sprocket shaft.

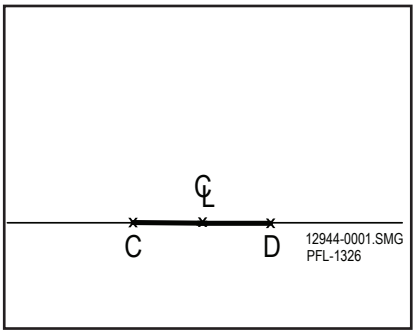
NOTE

Leave all wood shipping blocks in place until all modules have been stacked, bolted together, and lift chains connected.

Approximate weights of each module:
First level is 1,100 lbs (499 kg).
Upper level module is 700 lbs (318 kg).
Middle module is 90 lbs (41 kg) per foot (305mm).



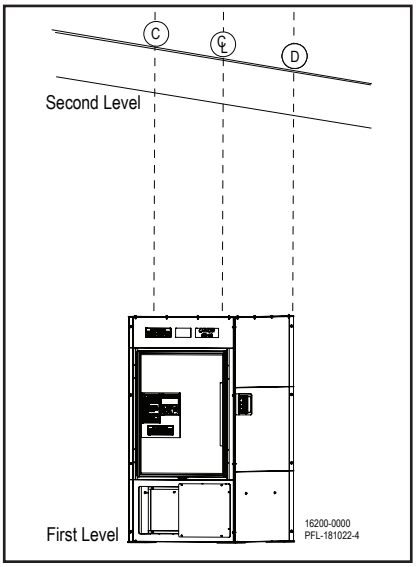
Align Floor-to-Floor Figure 21-5



Align Lower Floor Figure 21-6

Move the First Level Module into Position

1. Remove plastic wrap and unstrap each module from the skid.
2. Review the weight of the module assembly to confirm that the pick point or lifting apparatus will withstand the weight.
3. Use a suitable hoisting system that complies with local regulations.
4. Put a sling around the center plate using proper rigging techniques and attach the lifting device.
5. Remove the lag bolts attaching each module to the wood pallet. Do not remove bolts holding the lift sides to the bottom lift frame.
6. Carefully and slowly lift the first level module.
7. Move the module to align the center of the effective carriage deck to the center line floor marks. See Figure 21-7.



Place First Level Module Figure 21-7

NOTICE

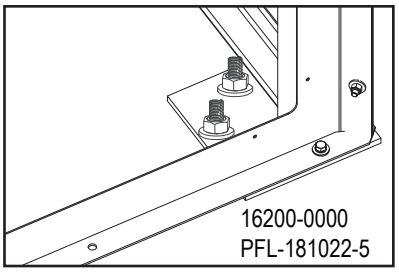
If the module needs to be pushed into place, push only on the edges of the module. Use a block of wood on the bottom frame to tap into place. Do not push on the face of the sheet metal panels to avoid denting the surface.

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Anchor the First Level Module

1. Remove the screws holding the front access cover plate on the first level module in place. Remove the front access cover.
2. Verify the proper floor anchor size and type for the job site. Special conditions (e.g., seismic site location) require that proper anchoring and bracing methods are used.
3. When the first level module is plumb, anchor the first level module base plates to the floor according to local or state codes especially in seismic zones.

PFlow Industries, Inc. recommends a minimum of 1/2" x 4" (13mm x 102mm) long wedge style anchors installed according to the manufacturers instructions. See Figure 21-8.



Anchor the First Level Module Plates
Figure 21-8

Stack and Attach the Middle Module(s)

1. Remove the two bracing angles bolted to the top of the first level module.
2. Lift the middle module and stack on top of the first level module.
3. Attach the two sections together using 5/16" x 1" hex bolts, 5/16" flat washers, and 5/16" nylock nuts.
4. Repeat steps 2 and 3 if there is more than one middle module.

Stack and Attach the Second Level Module

1. Lift the second level module and stack on top of the middle module.
2. Attach the two sections together using 5/16" x 1" hex bolts, 5/16" flat washers, and 5/16" nylock nuts.

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

Read this entire manual. Verify the job site dimensions against the PFlow Industries, Inc. General Arrangement (GA) drawing before starting the installation. If the site conditions do not match the GA drawing, please consult the PFlow Industries, Inc. Customer Support Department.

⚠DANGER

Falling equipment hazard! The installation of this equipment requires a qualified installer with extensive knowledge and experience on how to rig, erect, and support structural steel. Be sure to properly support the modular sections and panels during installation. Do not depend on the base plates or feet to prevent the stacked sections and panels from falling.

NOTICE

A qualified person is defined as a person who, by possession of a recognized degree or certificate of professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve problems relating to the subject matter and work.

⚠CAUTION

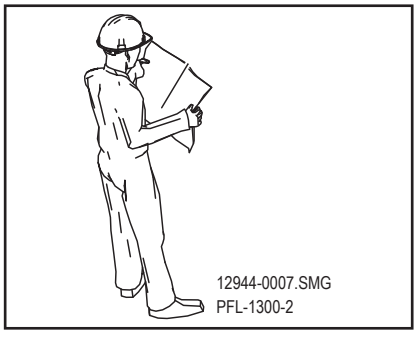
Lifting hazard! Components and accessories may be heavy. Use the appropriate lifting apparatus or get help when moving or lifting.

Required Anchoring and Bracing Guidelines

Anchoring and bracing of the Vertical Reciprocating Conveyor (VRC) is ***required***. Illustrations in this section are to be used for reference only. Job site conditions may require a different alternative to those PFlow Industries, Inc. suggests in this document. A job specific bracing drawing may be provided. Verify drawing details prior to beginning any field bracing work. Before any final field welding is done, verify that the VRC modular sections are aligned correctly.

All field welding must conform to the latest edition of AWS D1.1. The weld filler material is to be a minimum of E60xx.

- Fully weld horizontal floor braces.
- Fully weld support bracing at upper levels (unless shown otherwise).



Review GA Drawing
Figure 22-1

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Bracing Side to Side and Front to Back

Bracing the Vertical Reciprocating Conveyor (VRC) is required side to side and front to back. Bracing of the VRC and enclosures is the responsibility of the installer.

It is the customer's responsibility to make sure that the job site conditions have a structure with enough strength to be used for bracing in order to withstand the forces of weight and gravity.

NOTE *If PFlow Industries, Inc. prepared seismic bracing materials, the bracing requirements and the General Arrangement (GA) drawing are provided in the shipping packet.*

Bracing Supplies

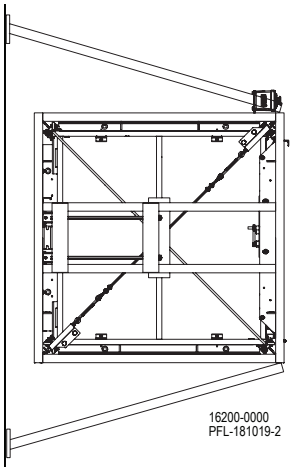
Typically, for a two-level VRC, PFlow Industries, Inc. supplies:

- (2) 61-5/8" (1,565 m) lengths of angle
- (4) mounting plates

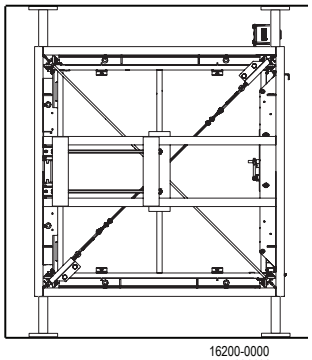
NOTICE PFlow Industries, Inc. does not supply anchor bolts nor guarantee that the above material is sufficient for the application. It is the installer's responsibility to verify the information included in the shipping packet prior to commencing work.

⚠ DANGER

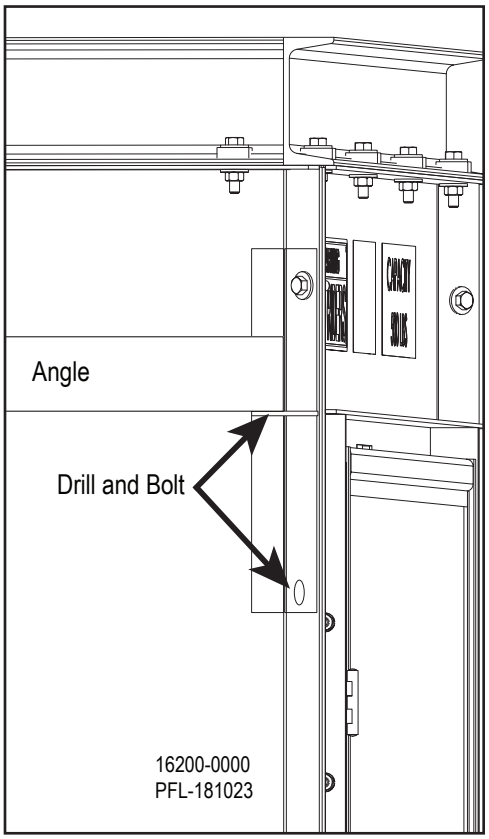
Falling VRC hazard! To avoid serious personal injury or death, do not operate the carriage or load the VRC until the VRC bracing is adequately sized and welded.



Typical Mezzanine
Figure 22-2



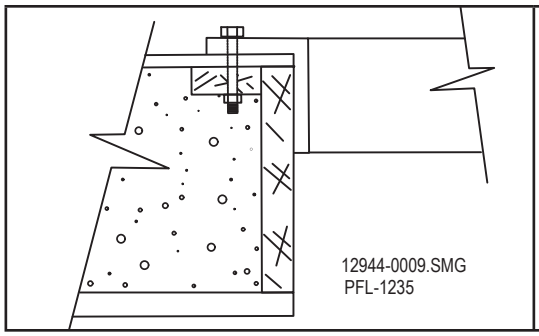
Typical Shaftway
Figure 22-3



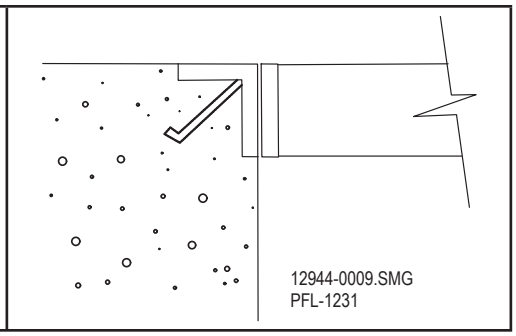
Angle Attachment
Figure 22-4

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

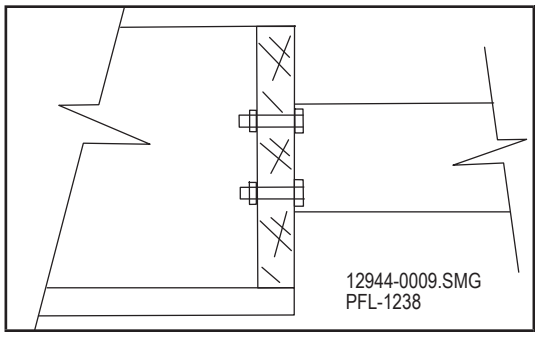
Anchoring Guidelines



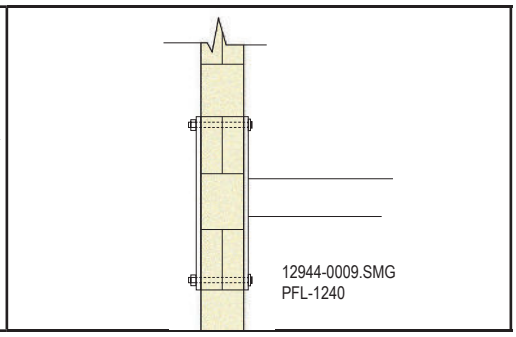
Using a tie plate Figure 22-5



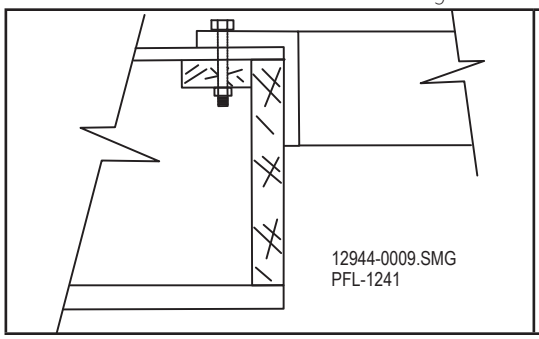
Welding to a curb angle Figure 22-6



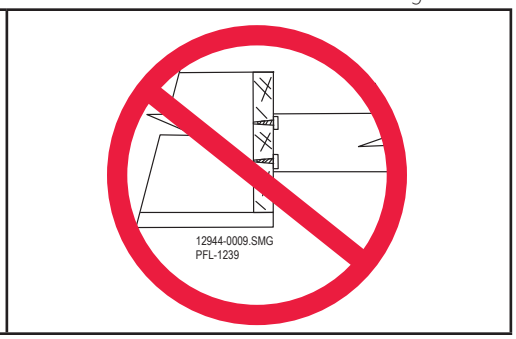
Anchoring to a wood floor - through bolting Figure 22-7



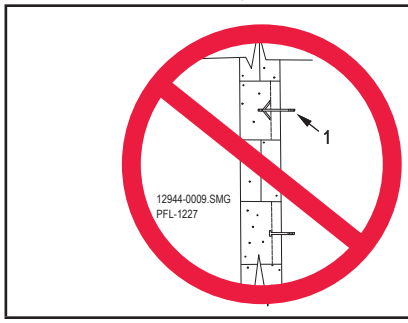
Anchoring to a CMU wall with backing plates Figure 22-8



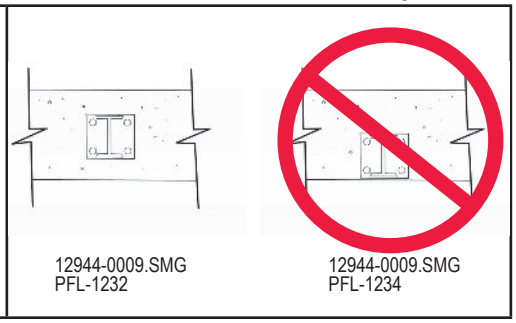
Anchoring to a wooden floor (preferred method) Figure 22-9



Anchoring to a wooden floor (not recommended) Figure 22-10



Anchoring to CMU wall (not recommended) Figure 22-11



Anchoring mounting plate to solid floor Figure 22-12

MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

Read this entire manual before installing the Vertical Reciprocating Conveyor (VRC).

⚠ DANGER

- The installation of this equipment requires a qualified installer with extensive knowledge and experience on how to rig, erect, and support structural steel.

- High Voltage! A qualified electrician must install all electrical connections and permanent wiring in accordance with applicable local or national electrical codes. Make sure the equipment is properly grounded in accordance with local electrical codes or, in the absence of local codes, with the current edition of the National Electrical Code NFPA No. 70.
- Keep clear of unsupported platforms. Stay out of the area under a raised platform. If a maintenance operation requires the carriage to remain in the raised position, use a means of support such as adequately sized maintenance chains, or straps with shackles around the top of the carriage frame that are capable of supporting the weight of the carriage. Refer to Bulletin 15709-0083 for additional information.

⚠ WARNING

- Assess the VRC and identify any potential load jams.
- Lockout/tagout equipment before performing any adjustments or maintenance. If the equipment is not locked out, it could start unexpectedly and cause injury or damage. ***Make sure all personnel are aware of the potential for stored energy to be present even after the power has been locked out.*** Refer to ANSI Z244.1 and OSHA 29 CFR 1910.147 for minimum requirements for a lockout/tagout system. There may be additional state or local requirements.
- Toppling Hazard! Secure all VRC components (e.g., lift chain, carriage) that may fall during the installation process.

- Falling Hazard! Secure all VRC access areas (e.g., doors, push-button stations) before any installation is begun. Never leave the VRC unattended with the doors in the open position. Never close doors when a person is on or under the carriage.

NOTICE

A qualified person is defined as a person who, by possession of a recognized degree or certificate of professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve problems relating to the subject matter and work.

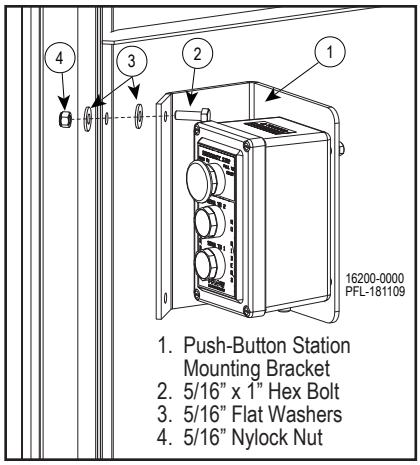
Personnel to carry out work on the VRC must exclusively be qualified personnel who - based upon their education, experience, instructions as well as knowledge concerning relevant standards and provisions, accident prevention, regulations and operating conditions - have been authorized by the person being responsible for safety, to carry out the activities described in these instructions and who - when doing so - are in a position to recognize possible risks early and to avoid them.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Install Push-Button Stations

1. Remove the existing hex bolt, flat washers, and nylock nut from the vertical flange nearest the door handle. See Figure 23-1.
2. Install the push-button station mounting plate and secure with the existing hex bolt, flat washers, and nylock nut.
3. Repeat steps 1-2 for each push-button station.

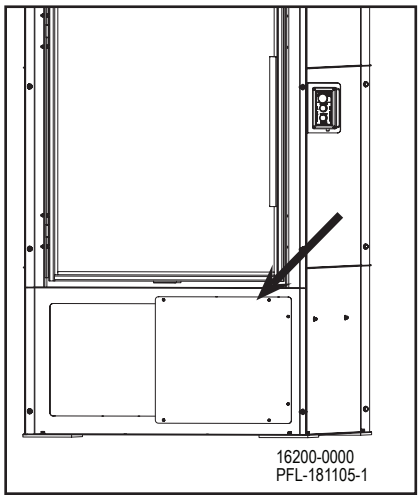
NOTE *PFlow Industries, Inc. provides quick connect cables with screw-on connectors on each end. These attach the push-button stations, door interlocks, and limit switches to the control panel. Extensions are available if needed.*



Attach Push-Button Station Mounting Bracket Figure 23-1

Connect the First Level Push-Button Station

1. Remove the access cover below the lower level door to gain access to the control panel and cables. See Figure 23-2.
2. Connect cable (PB1) pre-routed through the hole with grommet in the lower panel to the mounted first level push-button station.
3. Secure the cable outside the VRC to avoid interference with surrounding traffic.

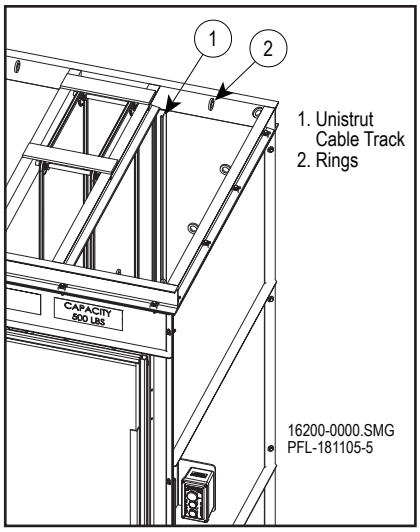


Remove Access Panel Figure 23-2

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Connect the Second Level Push-Button Station

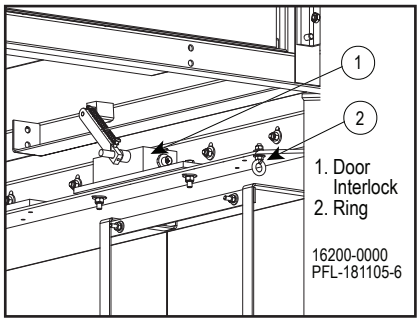
1. Route upper electrical component cables (e.g., floor level limit switch, overtravel limit switch, door interlock cable, and push-button cable) from the unistrut cable track on the lower section to the top of the lift. See Figure 23-3.
2. Insert the unistrut covers and secure.
3. Match wire tag to the device and route the quick connect cable for the upper push-button station up and over the top of the VRC and then down along the outside edges of the VRC to the push-button station mounted near the door handle.
4. Attach the quick connect cable to the second level push-button station. Secure the cable inside and outside the VRC to avoid interference with moving parts of the VRC.
5. Loop and secure excess cable to an interior eye bolt with tie wraps.



Route Upper Electrical Component Cables
Figure 23-3

Connect the Limit Switches and the Door Interlock Cables

1. Route the upper electrical component cables from the unistrut through the rings along the frame of the modular walls. See Figure 23-4.
2. Match wire tags for each device and attach the appropriate quick connect cable to each limit switch and door interlock. Secure the cables inside the VRC to avoid interference with moving parts of the VRC.
3. Loop and secure excess cable to an interior eye bolt with tie wraps.



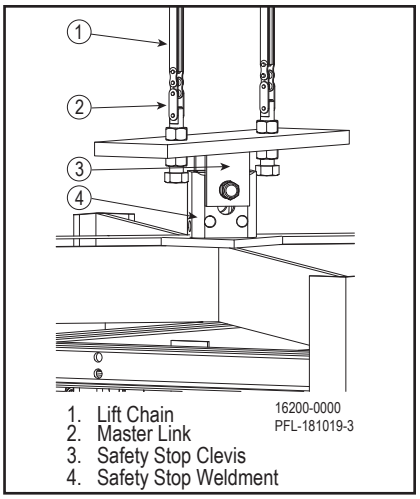
Route Lower Electrical Component Cables
Figure 23-4

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

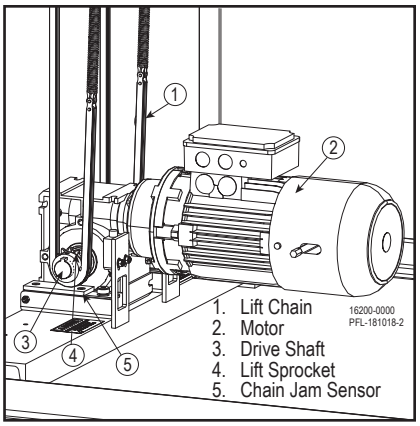
Install Lift Chains

For shipping purposes, the lift chains are held from rolling over the upper idler sprockets with bolts through the chain and into a wood shipping block at the top of the VRC. Leave all wood shipping blocks in place.

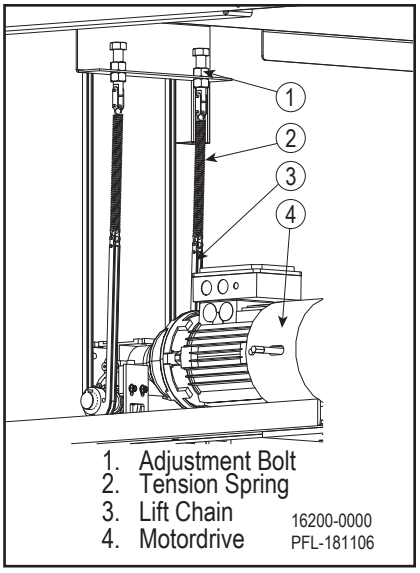
1. Uncoil the lift chains at the top of the VRC.
2. Make sure the lift chains are not twisted and positioned around the upper idler sprockets without kinks or gaps.
3. Connect the upper portion of the lift chains to the safety stop bar with a master link. See Figure 23-5.
4. Connect the loose ends of the lift chains behind the carriage to the upper ends of the lift chains.
5. Make sure that the lift chains are not twisted and are positioned around the bottom lift sprockets without kinks or gaps. See Figure 23-6.
6. After connecting all ends of the chains, remove all wood blocks attached to the chains by screws. The carriage should be hanging free on the chains.
7. If necessary, adjust the tension in the spring using the adjustment bolts. The tension springs should extend approximately 4" (102mm). See Figure 23-7.
8. Verify that the gap between the chain on the lift sprocket and the UHMW pad is less than 1/8" (3mm). Shim if necessary to reduce the gap.



Attach Master Link
Figure 23-5



Position Chains Around Sprockets
Figure 23-6



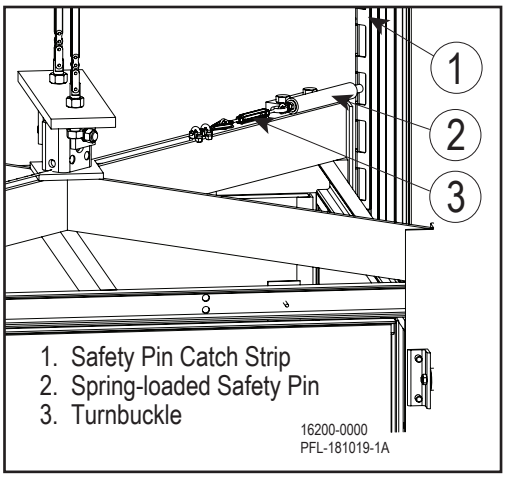
Adjust Tension Spring
Figure 23-7

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

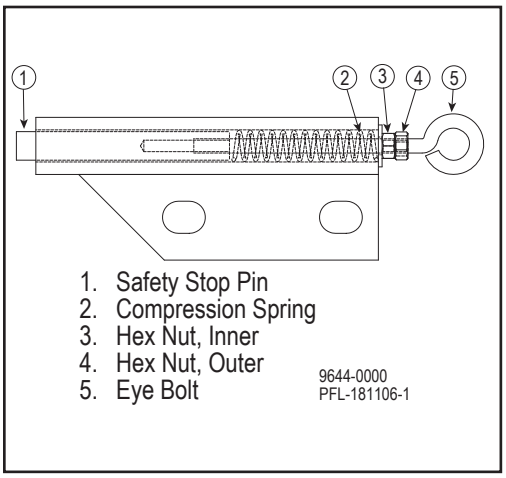
Review Safety Stop Pins

The carriage must be hanging free on the chains. See Figure 23-8. The safety stop pins require a running clearance of 1/4" to 3/8" (6mm to 10mm) from the safety pin catch strip. If the clearance is less than 1/4" (6mm), adjust the spacing as outlined below.

1. Loosen the outer hex nut (item 4) on the eye bolt to meet the “eye”. Repeat for both safety pins. See Figure 23-9.
2. Tighten the inner hex nut (item 3) against the outer hex nut to lock into place.
3. Adjust the turnbuckles if needed.



Safety Pin
Figure 23-8



Safety Pin Adjustment
Figure 23-9

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

Read this entire manual.

Purpose

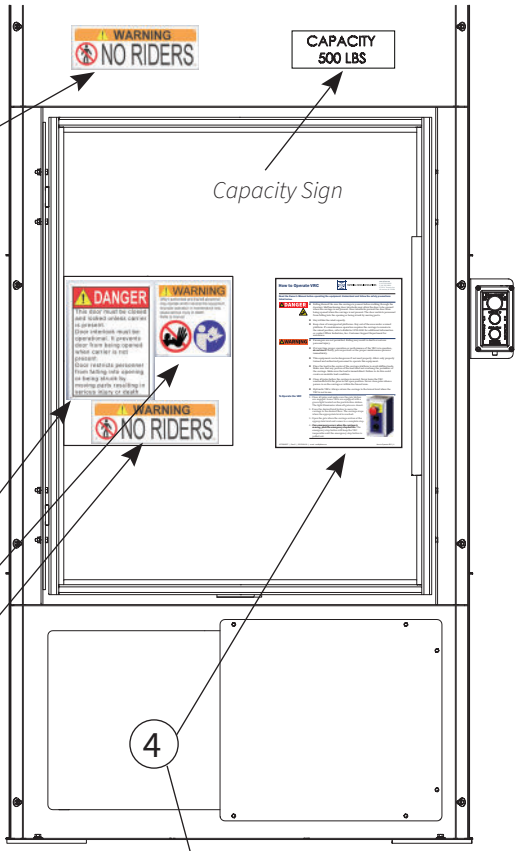
The PFlow Industries, Inc. Vertical Reciprocating Conveyor (VRC) is designed for the movement of materials only, up to the VRC's rated capacity, from one level to the next. Passengers are not allowed. The placement of capacity labels, safety information, and operation instructions are the installer's responsibility. Make sure the warning labels are placed on each door and each push-button station. The "How to Operate" placard should be placed near the push-button station.

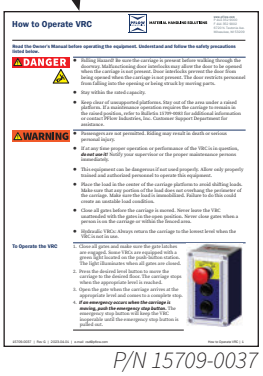
PFlow Industries, Inc. supplies the appropriate signage in a manilla envelope in the parts carton with the original shipment. Contact PFlow Industries, Inc. Customer Support Department for signage if another language is needed.

Large P/N 10651-0000
Small P/N 10655-0000

P/N 16794-0000

P/N 10653-0000





P/N 15709-0037

MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Before You Begin

Read this entire manual.

⚠DANGER

High Voltage! A qualified electrician must install all electrical connections and permanent wiring in accordance with applicable local or national electrical codes. Make sure the equipment is properly grounded in accordance with local electrical codes or, in the absence of local codes, with the current edition of the National Electrical Code NFPA No. 70.

⚠CAUTION

The incoming voltage source must match the voltage identified on the rating tag. The rating tag provides essential technical information required for any installation, maintenance, or repairs. Do not remove, damage, or modify the rating tag. Connect all push-button stations, door interlocks, limit switches, and accessories before applying power to the control panel. Never override any electrical component or manually operate the motor starter to operate the Vertical Reciprocating Conveyor (VRC).

⚠CAUTION

PFlow Industries, Inc. does not recommend or support the use of temporary power for its equipment. The customer assumes all responsibility for any damage to PFlow equipment resulting from its use.

Mechanical Checks

1. Confirm that all bolts on the VRC are tight.
2. Make sure all wood blocks attached to the chains are removed.
3. Use the lower level access area to remove the wooden shipping blocks from the corners underneath the carriage.
4. Make sure vertical travel is clear.
5. Confirm that bracing and finish welds are complete.
6. Verify that the resistor bank (if applicable) is installed horizontally or as shown in the wiring schematic.

Static IO Checks

1. Verify that the appropriate wire sizes are used for the incoming power and the motor connections.
2. Make sure adequate wire insulation has been removed and terminal block connections are making full contact.
3. Verify the terminal block L1, L2, and L3 are tight and torqued appropriately.
4. Verify that all switches are installed.
5. Verify that all switches turn on/off (IO) using a continuity check with a meter and that the switches match the wiring schematic.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Power Up

1. Verify that the incoming voltage is correct.
2. Apply power at the main disconnect switch, then the main control panel.
3. Turn individual breakers on one at a time.
4. Verify all IO inputs to the PLC. Mark off on wiring schematic when each has been tested. Make sure all inputs on the schematic have been tested.
5. With the Emergency stop (E-stop) button on the main control panel depressed, verify each device correctly switches the state of the PLC IO.
6. Pull out the E-stop button on the main control panel.
7. Press the "Send to 2" button on the push-button station and confirm that the motor shaft rotates in the correct direction. Press the E-stop button.

NOTE *If the motor is not operating in the correct direction, stop the motor immediately. Using established Lockout/Tagout procedures, have a qualified electrician inspect and switch the T1 and T2 wires of the incoming 3-phase power for the motor. Confirm that the motor shaft rotation is correct after any wiring change has been made.*

Confirm Emergency Stop Safety Operation

1. Push the "Send to 2" button on the push-button station just long enough to confirm that the carriage begins to rise. Push in the Emergency Stop (E-stop) button on the push-button station.
2. Pull out the E-stop button on the push-button station.
3. While you and the carriage are at the first level, push in the E-stop button on the push-button station.
4. Push the "Send to 2" button on the push-button station. The carriage should not move.
5. Pull out the E-stop button on the push-button station.
6. Repeat steps 1-5 at each push-button station.

NOTE *If pushing in the E-stop button on the push-button station does not stop the carriage from moving, immediately disconnect power to the VRC.*

If nothing happens when the "Send to 2" button is pushed, contact PFlow Industries, Inc. Customer Support Department for troubleshooting assistance.

Remove Wooden Shipping Blocks

1. Push the "Send to 1" button on the push-button station.
2. Remove the wooden shipping block under the clevis.

Inspect for Binding

1. Push the "Send to 2" button on the push-button station.
2. Raise the carriage 1' (305mm) and push in the emergency stop button. Make sure the safety stop pins on top of the carriage have a running clearance of 1/4" to 3/8" (6mm to 10mm) from the safety pin catch strip. Confirm that the safety stop pins are centered in the slots of the strip.

NOTE *If side to side adjustment is needed, remove bolts on the safety stop pin weldment, reposition the weldment for proper distance, tap new holes, replace, and tighten bolts.*

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Confirm Carriage Stops are Level with the Door

1. Pull out the emergency stop button and push the "Send to 2" button on the push-button station.
2. Make sure the carriage deck stops level with the door opening of each level. Adjust the floor level limit switch or overtravel limit switch position if necessary. The carriage should not "bottom out" or "top out" against any physical stops.

Confirm Door Interlock Operation

1. While you are at the first level and the carriage is traveling up, attempt to open the door. The door should not open while traveling, and the carriage should continue to travel up.

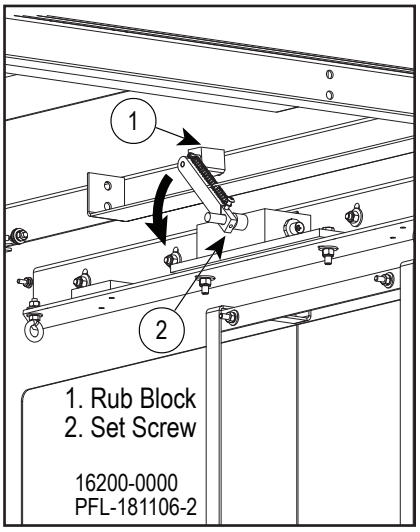
NOTE

If the carriage stops but the door will not open, call PFlow Industries, Inc. Customer Support Department for troubleshooting assistance.

2. While the carriage is at the second level, attempt to open the first level door. The door should not open.
3. Push the "Send to 1" button on the push-button station.
4. Attempt to open the first level door. The door should not open.
5. Attempt to open the first level door when the carriage has reached the first level. The door should open.

NOTE

If the door does not open, adjust the interlock arm. Loosen the bolt on the side of the arm and the set screw at the end of the arm. Do not adjust the rub block past vertical. The rub block must be able to pivot down past the end of the bar. If the rub block pivots in the wrong dir15ection, the device will jam. Tighten the bolt and set screw when the arm is positioned properly. See Figure 25-1.



Adjust Rub Block
Figure 25-1

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Conduct a Load Test

⚠WARNING

Avoid Shifting Loads! Place the load in the center of the carriage platform. Lock rolling casters in place. Make sure that any portion of the load does not overhang the perimeter of the carriage. Prevent unstable load conditions and jams.

1. With the carriage deck at the first level, add weight up to, but not to exceed, the VRC's rated capacity.
2. Close the door and push the "Send to 2" button on the push-button station.
3. Monitor the position of the carriage deck as it reaches the second level.
4. Take an amp rating and record it.
5. Continue to monitor the position of the carriage deck. Allow the VRC to hold the carriage at the upper level for a half hour.

NOTICE The motor brake is not holding if the carriage deck drops below the second level. Make a note of the weight used, and the amount of time that the carriage deck held the position before dropping down. Push the "Send to 1" button and contact PFlow Industries, Inc. Customer Support Department for troubleshooting assistance.

PFLOW INDUSTRIES MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Post Installation Checklist

Make sure all steps are completed. Sign and return to PFlow Industries, Inc. Customer Support Department via e-mail to csd@pflow.com

√	Verify Mechanical Completion
	All bolts are tight.
	Final bracing for the VRC is completed from front to back and from side to side. Inspect each level.
	The door opens when the carriage is present. Verify at each level.
	The door does not open when the carriage is not present. Verify at each level.
	Excess door interlock cables are routed as straight as possible and not spooled in coils tighter than 28" (711mm).
	All operational signs are posted.
	All weld marks, scrapes, etc. are touched up with paint.
	There is no excessive noise or binding during travel.
	The installation site is clean and all debris is removed.
	The customer received instructions regarding proper VRC operation.
	The customer received instructions regarding preventive maintenance of the VRC.
	The customer received instructions regarding procedures in the event of a problem or safety related issues.
	Identify any unsafe condition. Document and report the condition immediately to the customer and then PFlow Industries, Inc. Customer Support Department. Do not allow the VRC to operate when unsafe conditions arise.

Additional Notes or Follow-up Requirements

PFlow Serial Number:	Customer/User:	Date:
Mechanical Checklist Completed by:		E-mail Address:
Company:		Phone Number:

MATERIAL HANDLING SOLUTIONS
www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Post Installation Checklist

Make sure all steps are completed. Sign and return to PFlow Industries, Inc. Customer Support Department via e-mail to csd@pflow.com

✓	Verify Electrical Completion
	Make sure all electrical connections are tight and properly made.
	The push-button station operates correctly on all floor levels.
	The emergency stop button operates correctly on all floor levels.
	The floor level limit switches are adjusted and the carriage stops level at each door.
	The overtravel limit switch is adjusted and the carriage stops before reaching the top cross beams.
	The door opens when the carriage is present. Verify at each level.
	The door does not open when the carriage is not present. Verify at each level.
	The VRC does not operate with any door open.
	The installation site is clean and all debris is removed.
	The customer received instructions regarding electrical control panel location and power shutoffs.
	The customer received instructions regarding procedures in the event of a problem or safety related issues.
	Identify any unsafe condition. Document and report the condition immediately to the customer and then PFlow Industries, Inc. Customer Support Department. Do not allow the VRC to operate when unsafe conditions arise.

Additional Notes or Follow-up Requirements

PFlow Serial Number:	Customer/User:	Date:
Electrical Checklist Completed by:		E-mail Address:
Company:		Phone Number:

Installation Questionnaire

MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Thank You

PFlow Industries, Inc. would like to thank you for the opportunity to serve you. Your business is appreciated. Please help us to ensure that your expectations are met by taking a few minutes to tell us about the equipment and service that you have received. Complete the Installation Questionnaire and Acceptance Certificate. Return both forms to PFlow Industries, Inc. via e-mail to csd@pflow.com. Additional space for comments is available on the next page.

	Yes ✓	No ✓
Product Perception		
Was the equipment shipment complete as expected?		
What items were missing, if any?		
Was the equipment in good condition?		
Describe the equipment damage or concerns with the workmanship, if any.		
Did the equipment match the General Arrangement (GA) drawing?		
Was the equipment dimensionally correct with form, fit, and function?		
Describe any problem areas in detail.		
Electrical Installation		
Was the electrical field wiring completed as required?		
Were there any issues with the electrical components?		
After the electrical installation was completed, was it necessary to return for final adjustments, testing, and training?		
Were you made aware of any electrical problems?		
Describe any “No” answers in detail.		
Testing		
Was the equipment tested at full load capacity?		
Were all gates tested to ensure proper operation and interlock operation?		

PFlow Serial Number	Customer/User	Date
Questionnaire Completed by	E-mail Address	
Company	Phone Number	

MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Acceptance Certification

MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209

Acceptance

We, the Customer, accept the equipment listed below as being properly installed, tested, and performing to our satisfaction. This form covers both the mechanical and the electrical installation of the equipment. This acceptance in no way releases either PFlow Industries, Inc. or the installing contractor(s) of any warranty obligations. If there are any exceptions or unresolved items, please include detailed information.

PFlow Serial Number:	Model Number:	☐ B	☐ D	☐ DB	☐ F	☐ M	☐ 21	Other _____
Job Name:								
Site Street Address:								
Site Mailing Address:								
Site City:					State:		Zip Code:	
Customer Contact Name:					Contact Title:			
Customer Contact Phone: ( ) Ext					E-Mail:			

Tests Performed					
	Load Capacity:			Start-up Date:	
	Load Test:	☐ Yes	☐ No	at ____ % of lift capacity	Customer Initials:
	Operation Test:	☐ Yes	☐ No		Comments:
	Gate/Interlock Operation:	☐ Yes	☐ No	☐ Not Applicable	
	Other Test:				
	Other Test:				

Personnel Instructed on the Operation and Preventive Maintenance:	
Name:	Company:
Name:	Company:

Accepted by:	Acceptance Date:
Name/Phone:	PFlow Rep Present:
Title:	Name:
Company:	Company:

Please return a copy of this form to the PFlow Industries, Inc. Customer Support Department at csd@pflow.com.

MATERIAL HANDLING SOLUTIONS

www.pflow.com
P 414 352 9000
F 414 352 9002
6720 N. Teutonia Ave.
Milwaukee, WI 53209