



**MATERIAL HANDLING SOLUTIONS**

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

**Customer:**  
**Job Number:**

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## **F Series | Mechanical VRC 4-Post Straddle**

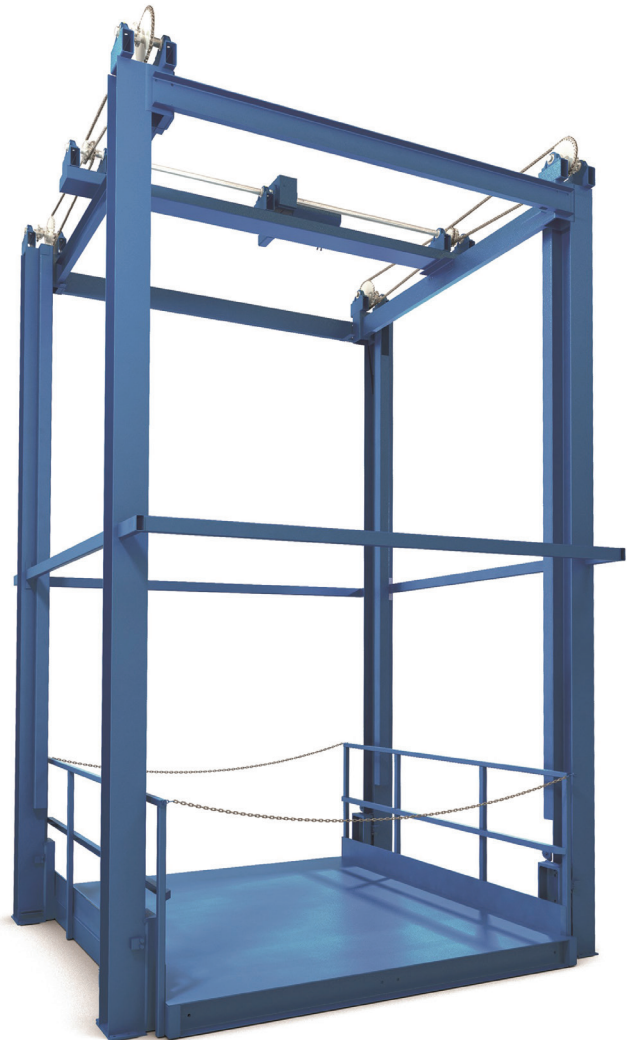
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### **Owner's Manual**

#### **Important:**

**Read this entire manual.  
Important safety information  
is included.**

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





Description		Section   Page
<b>1. Contact Information</b>	15705-0011	1   1
<b>2. General Information</b>	15710-0004	2   1
Introduction		2   1
General Overview		2   1
Code Requirements		2   1
Parts		2   1
Service		2   1
Feedback		2   1
<b>3. Warranty Information</b>	15710-0014	3   1
Parts and Labor		3   1
Definitions		3   1
Warranty		3   1
Exclusions		3   1
Obligation		3   1
Liability		3   2
Warranty Procedures		3   2
Pre-Authorization		3   2
Invoices		3   2
<b>4. Important Safety Information</b>	15708-0200-01	4   1
Read the Entire Manual		4   1
Intended Purpose		4   1
Potential Risks and Possible Misuse		4   1
Safety Alert Symbols		4   1
Danger Statements		4   2
Warning Statements		4   2
Caution Statements		4   4
Electrical Safety Precautions		4   5
De-energize the Circuit		4   5
Electrical Safety Precautions		4   6
Working on Energized Circuits		4   6
Notes for the Installation Electrician		4   6
Entrance Below a Raised Carriage Deck	15709-0083	4   7
<b>5. Glossary</b>	15710-0018	5   1
Unique Descriptions and Names		5   1
Gate Types		5   8
Identifying Call Outs		5   9



Description		Section   Page
<b>6. Electrical Standards and Definitions</b>	15709-0085	6   1
Field Electrical Wiring Standards		6   1
Definitions		6   1
Requirements		6   1
Electrical Ruling Bodies		6   2
PFlow's Standard		6   2
Outdoor Application		6   2
Corrosive Application		6   2
Hazardous Location		6   3
Class Definitions		6   3
Division Definitions		6   3
Group Designations		6   3
<b>7. Mechanical Overview</b>	15704-0008	7   1
Lift Columns		7   1
Drivebase Assembly		7   2
Wheelblock Assembly		7   3
Lift Chains		7   4
Wheelblock Safety Cam Function		7   5
Enclosures		7   6
Gate Assemblies		7   7
<b>8. Electrical Overview</b>	15704-0009	8   1
Main Control Panel		8   1
Push-button Stations		8   1
Main Disconnect Switch		8   1
Drivebase Assembly		8   2
Limit Switches		8   2
<b>9. Sequence of Operation</b>	15704-0015	9   1
Operation Notices and Warning		9   1
Sequence		9   2
To Operate the Lift		9   5



<b>Description</b>		<b>Section   Page</b>
<b>10. Eurodrive Operation and Maintenance</b>	15705-0015	10   1
Eurodrive Reducer		10   1
Oil Level		10   2
Lubrication		10   2
Maintenance		10   2
Storage		10   2
Enclosures		10   2
Bearings		10   3
Insulation Classes		10   3
Supply Voltages and Frequencies		10   3
Ambient Temperature and Altitude		10   3
<b>11. Eurodrive Brake Operation and Maintenance</b>	15709-0053	11   1
Eurodrive Brake Operation		11   1
Maintenance		11   1
BMG Brake System Operation		11   2
SR Relay Wiring (When Used)		11   3
Troubleshooting		11   3
Brake Components		11   4
Adjusting Brake Air Gap		11   5
Brake Disc Inspection		11   6
Hand Release Mechanism		11   7
Testing Brake Rectifier		11   7
<b>12. Cleaning</b>	15709-0088	12   1
Important Safety Information		12   1
Cleaning		12   1
<b>13. Preventive Maintenance and Schedule Checklist</b>	15704-0014	13   1
Important Safety Information		13   1
Checklist		13   2
<b>14. Troubleshooting</b>	15705-0021	14   1
<b>15. Adjust Overcurrent Sensor</b>	15709-0052	15   1
<b>16. Recommended Spare Parts</b>	15704-0013	16   1



Description		Section   Page
<b>17. Parts</b>	15704-0016	17   1
Drivebase Assembly		17   1
Chain Loop Arrangement		17   2
Chain Tensioner Assembly		17   3
Drive Chain Tension Sensor Assembly		17   4
Interlocks		17   5
Gate Status Switches		17   7
Wheelblock Attachment		17   8
Wheelblock Assembly		17   9
<b>18. Recommended Storage Requirements</b>	15709-0080	18   1
Stacking		18   1
Long Term Storage		18   1
Storage for Longer than Six Months		18   2
Equipment Manuals		18   2
<b>19. Signage Locations</b>	15709-0035	19   1
<b>20. Installation Questionnaire</b>	15708-1500	20   1
<b>21. Acceptance Certificate - VRC</b>	15710-0017-VRC	21   1



# Table of Contents



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Milwaukee, WI 53209

## Customer Information

**Customer Name**

**Job Number**

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## Job Drawings

**Description**

**Document #**

**Revision**

Description	Document #	Revision

## Electrical Drawings

**Description**

**Document #**

**Revision**

Description	Document #	Revision

# Table of Contents



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[www.pflow.com](http://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



Product Support Department  
e-mail: psd@pflow.com

Sales  
e-mail: sales@pflow.com



For a list of contact personnel visit the PFlow Industries, Inc. website at:  
<http://www.pflow.com/contact-us/>

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## 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.

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## Copyright Notice

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## Trademarks

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

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## System Modifications/Disclaimer

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

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## Training

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

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## On-site Supervision

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

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## Source Language

This manual is written in American English.

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<b>Introduction</b>	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.
<b>General Overview</b>	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.
<b>Code Requirements</b>	<p><b><i>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.</i></b> VRCs are <b>not</b> 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 <a href="http://www.asme.org">www.asme.org</a> 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.</p>
<b>NOTE</b>	<p><i>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.</i></p>
<b>Parts</b>	<p>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.</p> <p>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.</p> <p>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.</p>
<b>Service</b>	The PFlow Industries, Inc. Product Support Department will assist maintenance and service personnel with any questions or problems regarding the equipment or installation.
<b>Feedback</b>	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.





**Parts and Labor**

<b>Parts:</b>		<b>Labor:</b>	
Structure	Lifetime	Structure	Lifetime
Manufactured Components	1 Year	Manufactured Components	1 Year
Purchased Components	1 Year	Purchased Components	90 Days
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.

**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 30 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.



**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. Product 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. Product 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:

<input type="checkbox"/> PFlow serial number.	<input type="checkbox"/> Labor hours expended resolving the problem.
<input type="checkbox"/> Date the work was performed.	<input type="checkbox"/> Rates per hour.
<input type="checkbox"/> Description of the problem.	<input type="checkbox"/> Copies of receipts for materials purchased.
<input type="checkbox"/> Travel time incurred.	<input type="checkbox"/> Detailed description of work completed.



**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.



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




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





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.

 **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 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.
- Falling column hazard! Make sure all beams, columns, posts, enclosure panels, and components are properly supported during installation. Illustrations may show the beams, columns, posts, enclosure panels, and components 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. Product Support Department for assistance.



 **WARNING**

- 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.
- 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 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.





### **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.
-  Falling Hazard! Close all gates before the carriage is moved. Never leave the lift unattended with the gates in the open position. Never close gates when a person is on the carriage or within the fenced area.
- Place the load in the center of the lift platform to avoid shifting loads. Make sure that any portion of the load does not overhang the perimeter of the carriage. This could create an unstable load condition.
- 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 lift motor brake 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.



 **CAUTION**

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

### 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.

**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 six feet [1829mm]).
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.



## 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.
  - ◇ ASME B20.1-2015 defines a qualified person 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 B20.1-2015 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 or automatically through the use of a factory supplied option known as maintenance mode.

## 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 the PFlow Industries, Inc. Product 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 lift 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 Factory.

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.

## Automatic Access - Maintenance Mode with DeckLocks

If the VRC is equipped with this option, refer to Maintenance Mode Sequence of Operation Bulletin #15879-0009 for details.



## 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.

<b>Alkyd paint</b>	A fast-drying enamel paint, color-mixed per the customer's request, and applied using standard methods as specified by the paint manufacturer.
<b>ANSI</b>	American National Standards Institute: <a href="http://www.ansi.org">www.ansi.org</a>
<b>ASME</b>	American Society of Mechanical Engineers: <a href="http://www.asme.org">www.asme.org</a>
<b>Authorized person</b>	Trained or qualified personnel approved to perform a specific duty or duties.
<b>Back-frame</b>	The vertical portions of the carriage on a cantilever VRC, typically a series D vertical support mast.
<b>Backstop panel</b>	Also known as a Mezzanine roll-off panel, this is a panel that is installed opposite the loading edge at upper loading levels of a VRC platform that does not penetrate a floor. The backstop panel helps protect personnel and/or products from falling off the platform when loading or unloading. This term should not be confused with the term "backstop" as defined in ASME B20.1.
<b>Backstop</b>	As defined by ASME B20.1; A mechanical device to prevent reversal of a loaded conveyor under action of gravity when forward travel is interrupted.
<b>BVAC</b>	A bi-panel vertical acting gate.
<b>Cantilever</b>	A style of VRC where the carriage rides along the guide columns that are located on the same side of the carriage. This style lift can accommodate loading on three sides; right, front, and left.
<b>Capacity</b>	The maximum load for which the VRC is designed.
<b>Carriage</b>	The entire structural assembly that travels on the guide columns and carries the load.
<b>Carriage gate</b>	A gate that is mounted directly on the carriage deck.
<b>CEMA</b>	Conveyor Equipment Manufacturers Association: <a href="http://www.cemanet.org">www.cemanet.org</a>
<b>Chain</b>	See Drive chain, Lift chain and Roller chain.




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<b>Chain Driven Live Roller (CDLR)</b>	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.
<b>Chain Guide Tube</b>	A tube welded to the back side of the VRC column that encloses the lift chain and tensioner chain.
<b>Chain tensioner</b>	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.
<b>Columns</b>	The vertical structural members in which the wheelblocks attached to the carriage travel up and/or down.
<b>Column splice</b>	Columns shipped in more than one piece must be joined in the field during installation. Field assembly and welding is required.
<b>Constant Pressure Push Button</b>	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.
<b>Controls</b>	Any combination of electrical devices used to control the operation of a VRC. This normally includes push buttons, relays, limit switches, interlocks, etc.
<b>Control Panel</b>	An enclosure housing various electrical components that control the VRC.
<b>Control voltage</b>	The control voltage is typically provided by the control transformer and is used to energize the various low voltage electrical devices.
<b>Conveyor, Vertical Reciprocating</b>	See Vertical Reciprocating Conveyor (VRC).
<b>Dead load</b>	A static load that is a permanent force, acting on a structure (see Platform).
<b>Deck</b>	The floor of the carriage (can be smooth plate, tread plate, or open).
<b>DeckLock System</b>	An added measure of safety to prevent uncontrolled descent of the carriage.
<b>Diagonal drop bar</b>	Load-defining bar and snap chain across operating end(s) of the carriage to define the load area on the platform which may minimize load movement. The diagonal drop bar is hinged at the base and swings down. This is not a load stop.
<b>Direct acting cylinder</b>	The cylinder which transmits lifting force directly to the carriage rather than through the use of cables, pulley, or chains.
<b>Drivebase assembly</b>	Gear reducer, brake motor and mechanical components that power the chain that lifts and lowers the carriage for mechanical VRCs. This assembly is typically mounted at the top of the lift guide columns.

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<b>Drive chain</b>	Drive chains on the F series mechanical VRC, through a series of a shaft and sprockets allow the carriage to be raised and lowered.
<b>Drift</b>	The action of a lift carriage slowly dropping, usually due to slight internal leaks in a hydraulic system or mechanical slippage of a motor brake.
<b>EBVAC</b>	An electrically powered bi-panel vertical acting gate.
<b>Effective width/length</b>	Refers to usable space for the materials load on the carriage, not the overall dimensions which includes space allowed for carriage side guards and snap chains.
<b>Electrical cable</b>	Electrical cables consist of at least two conductors contained within a protective outer cover.
<b>Enclosure (lift guarding)</b>	Structure surrounding a VRC to prevent outside interference with its normal operation and to safeguard personnel. Typically 8' (2438mm) high panels composed of expanded metal or other materials that will prevent a 2" (51mm) diameter ball from passing through (ASME B20.1 requirement).
<b>Epoxy coating</b>	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.
<b>EVAC</b>	An electrically powered single panel vertical acting gate.
<b>Expanded metal (EM)</b>	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.
<b>Explosion proof (EXP)</b>	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.
<b>Floor-to-Floor distance</b>	The distance from one operating floor level to the adjacent operating floor level (see Vertical travel).
<b>Full Height Enclosures (FHE)</b>	Structure surrounding the full height of a VRC to prevent outside interference with its normal operation and to safeguard personnel. Typically panels composed of expanded metal or other materials that will prevent a 2" (51mm) diameter ball from passing through (ASME B20.1 requirement).
<b>Gate</b>	A device that opens and closes manually or automatically to allow access to the carriage for loading and unloading. The gate is normally a swing, sliding, or vertical acting device constructed of similar expanded metal as the enclosure (see specific gate type).

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<b>General Arrangement (GA) drawing</b>	The drawing produced by PFlow Industries, Inc. which shows the VRC lift, gates, and enclosures. The drawing may show but does not specify building details.
<b>Guarded by location</b>	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)
<b>Guide angles</b>	Guide angles are attached to the guide column to help capture and contain the guide wheels in the columns and guide the carriage.
<b>Guide column</b>	The structural members connected to the carriage that guide the carriage travel up and down.
<b>Header</b>	Header refers to the horizontal structure spanning the width of the carriage or gate. The carriage header defines the load height on straddle units.
<b>HMI (Human Machine Interface)</b>	The user interface in the control system that provides graphic control of the VRC. The HMI communicates with the programmable logic controller (PLC).
<b>Hollow shaft</b>	VRC mechanical shaft of the mechanical drivebase which penetrates the gear motor rather than coupling to the gear motor. This minimizes wear points.
<b>Hydraulic cylinder</b>	A device which converts fluid power into linear force and motion. The hydraulic cylinder usually consists of a movable element such as a piston and piston rod, plunger or ram, operating within a cylindrical bore.
<b>Hydraulic power unit</b>	Refers to motor, pump, and reservoir assembly. The reservoir is shipped with oil. Most hydraulic power units come with the control panel attached and pre-wired to the hydraulic pump.
<b>Incoming voltage</b>	The main voltage being supplied for operation of the equipment.
<b>Interlock (Gate/Door)</b>	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 gate or access door unless the VRC carriage is present at that particular landing or opening.
<b>Intermediate level</b>	A floor level or levels between the uppermost and bottommost operating floor.
<b>Junction box</b>	An electrical control box used to join, centralize, and distribute wiring from different locations.
<b>Keylock control</b>	A keyed push button station that prevents unauthorized use of the VRC.
<b>Kick plate</b>	A curb on the outermost edge of the inoperable sides of the carriage deck which is designed to contain product and is a minimum of 4" (102mm) high.
<b>Knock-down (KD)</b>	Lift components shipped in two or more pieces. Typically field welding is required (e.g., KD carriage, KD headers, KD uprights, KD gates, etc.).



<b>Landing</b>	A permanent-working surface at a fixed elevation used for loading or unloading the carriage.
<b>Lift chain</b>	A chain that lifts the carriage and load.
<b>Lift location light</b>	Illuminated push button that indicates at which level the carriage is located.
<b>Lifted load</b>	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).
<b>Limit switch</b>	An electrical device which is used to control the carriage position and monitor various mechanical devices.
<b>Load pattern</b>	<p>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.</p> <ul style="list-style-type: none"> <li>● <b>“C” load pattern:</b> Carriage configuration allowing a load/unload opening on one side of the carriage deck.</li> <li>● <b>“Z” load pattern:</b> Carriage configuration allowing a load/unload opening on opposite sides of carriage deck.</li> <li>● <b>“90 degree” load pattern:</b> Carriage configuration allowing a load/unload openings at right angles on the carriage deck.</li> </ul>
<b>Load test</b>	The carriage is loaded to rated capacity, and the lift is operated.
<b>Macropoxy</b>	Macropoxy is a fast drying, polyamide epoxy designed to protect steel in industrial exposures. Ideal for protection of sharp edges, corners, and welds.
<b>Mechanical stop</b>	A mechanical means of stopping travel at a fixed position.
<b>Momentary contact push button</b>	A push button which only has to be pressed for an instant to activate the desired operation.
<b>Non-operating end</b>	The side(s) of a carriage not used for loading/unloading. Handrails or expanded metal sides and kick plate are normally supplied as minimum guarding.
<b>Operating end</b>	The side(s) of the carriage used for loading/unloading. At a minimum the side(s) are normally equipped with a safety chain as guarding.
<b>Overall dimension</b>	The outside dimension of the carriage structure or the entire lift.
<b>Overtravel limit switch</b>	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.
<b>Photo eye</b>	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 beam of light is detected by a sensor.
<b>Pit</b>	A depression in the floor a minimum of 1" (25mm) deeper than the carriage profile, which allows the carriage deck to be flush at operating floor or level.
<b>Platform</b>	The structure that forms the floor of the carriage and that directly supports the load (see Deck).
<b>Pneumatic gate operator</b>	A device that requires in-plant, clean and dry air to automatically open and close a gate. The device can be operated by either manually through the use of pull cords or push buttons, or automatically through the use of a PLC.




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<b>Pressure switch (hydraulic)</b>	A sensor which detects hydraulic pressure. The sensor can be set to trip at a predetermined pressure. When this pressure setting is reached, the pressure switch will activate, opening the control circuit and stopping the pump motor.
<b>Programmable Logic Controller (PLC)</b>	A micro-processor based device that controls the VRC or Cartveyor™ through a resident software program.
<b>Push-button (PB) station</b>	The wall mounted, pedestal mounted, or hand held device used to control the operation of the VRC.
<b>Qualified person</b>	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.
<b>Ramp</b>	An access ramp used to load on and off of a carriage deck.
<b>Rated load</b>	The load the VRC is designed for and installed to lift at a rated speed (see Lifted load).
<b>Reflector</b>	A plastic, prismatic object used to reflect a beam of light emitted from a photoelectric sensor.
<b>Roll-off panel</b>	See Back-stop panel.
<b>Roller chain</b>	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.
<b>Safety cam</b>	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 or gate panel from dropping more than a few inches.
<b>Side guards</b>	A protective enclosure on the outermost edge of the inoperable sides of the deck welded to the carriage to contain load. Can be rails, sheet steel, or expanded metal.
<b>Slack chain device</b>	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.

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<b>Spliced guide column</b>	Guide column that is fabricated and delivered in two or more sections necessitated by manufacturing, handling, or installation constraints.
<b>Sprocket</b>	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.
<b>Straddle</b>	A style of VRC where the carriage rides between two guide columns that are located on opposite sides of the carriage. This style of lift will accommodate “C” and “Z” type loading patterns.
<b>Top of roller (TOR)</b>	Top elevation of a horizontal conveyor system roller which is also the lower elevation of the load.
<b>Touchscreen</b>	See HMI.
<b>Transom</b>	A panel or panels used to close an enclosure opening above the VRC entrance.
<b>Travel</b>	The difference in elevation between the bottommost level of the carriage platform and the uppermost level of the carriage platform, regardless of whether the carriage is pit or floor mounted.
<b>UHMW (Ultra-High Molecular Weight)</b>	An abrasion-resistant, high-impact, polyethylene material used throughout the VRC to protect and/or guide moving parts.
<b>Uprights</b>	The portion of the carriage that houses the wheels that guide the carriage between the columns.
<b>VAC</b>	A single panel vertical acting gate.
<b>VFD (Variable-Frequency Drive)</b>	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.
<b>Velocity fuse</b>	A device that senses hydraulic flow across a control orifice when the pressure differential exceeds a predetermined amount. A spring-biased poppet closes, shutting flow to the damaged hydraulic circuit and prevents the lift carriage from descending.
<b>Vertical travel</b>	Distance the carriage deck travels; floor-to-floor or total distance (see Travel).
<b>Vertical Reciprocating Conveyor (VRC)</b>	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.
<b>VRC specification sheet</b>	PFlow Industries, Inc. informational data sheet providing general information on a specific VRC.
<b>Wheelblock assembly</b>	Sub-assembly fastened to the carriage upright that contains the guide roller elements and safety cam for the chain driven VRC lift. The lift chain is typically attached to the wheelblock assembly safety cam.

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**Gate Types:**

**Single swing gate**

This type of gate hinges on one side and latches on the other, may be either right or left-hand swing. Clear space is required in front of the VRC for the gate to swing open.

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**Bi-parting swing gate**

The bi-parting, swing gate has hinges on each side and latches in the center. Clear space is required in front of the VRC for the gates to swing open.

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**Single panel vertical acting gate (VAC)**

The VAC gate panel closes to the floor and opens in the upward direction.

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**Double panel vertical acting gate (BVAC)**

The BVAC gate is the same as the single panel VAC above in operation and use except the two (2) panels telescope from a nested position.

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**Horizontal sliding gate**

The horizontal sliding gate operates in the same manner as a vertical acting gate except the gate functions in the horizontal direction.

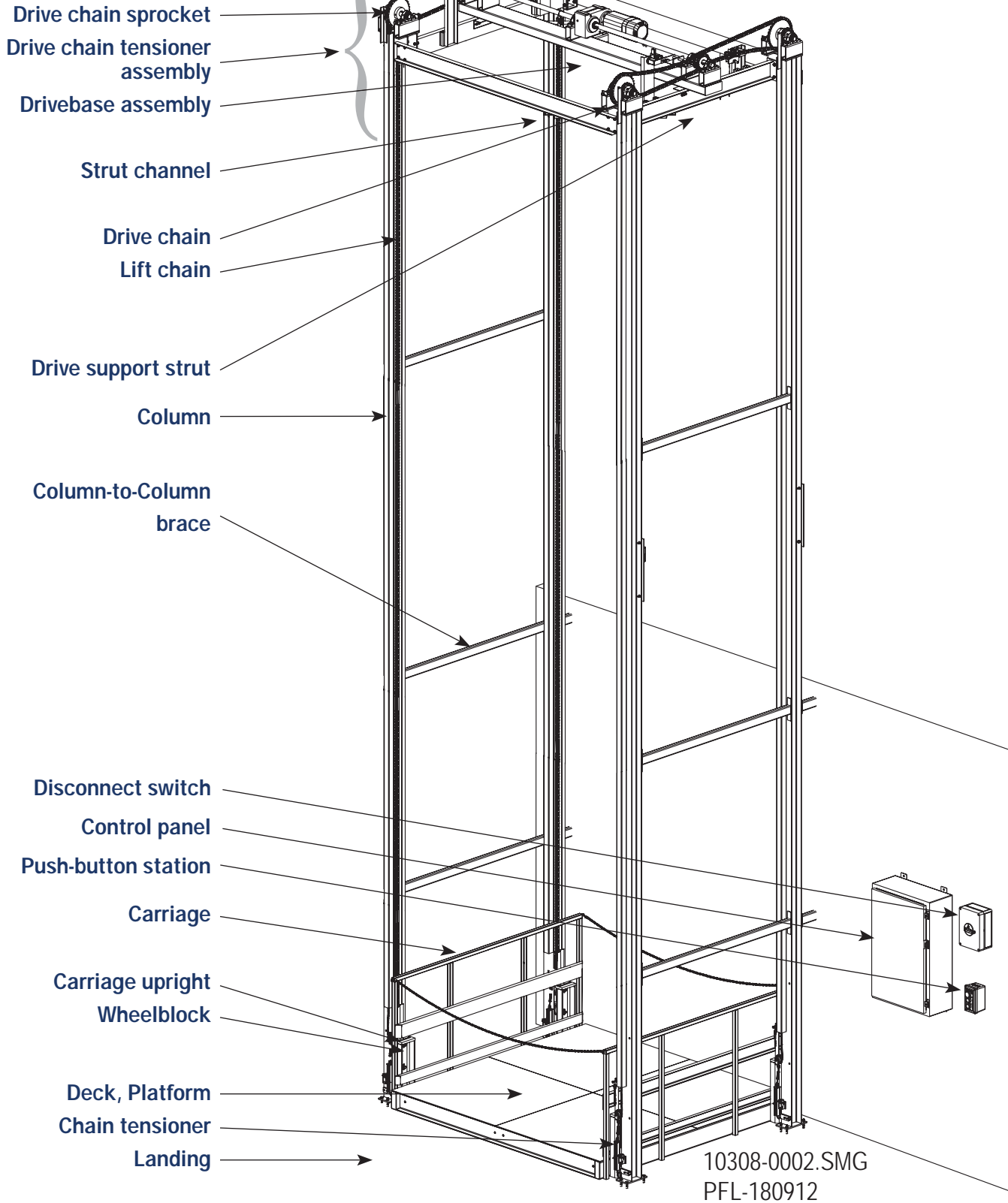
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**Roll-up door**

The roll-up door can be anything from an industrial type roll-up steel door to self-storage facility type door.

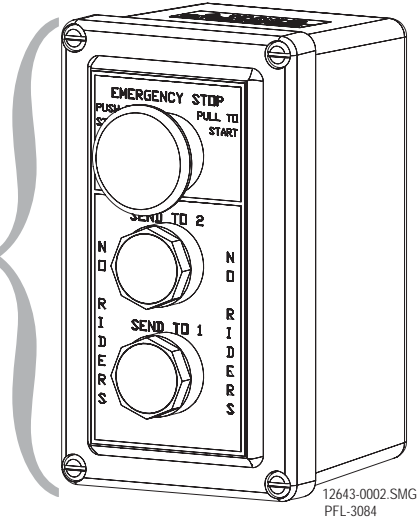
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**F Series**





Push-button (PB)  
station



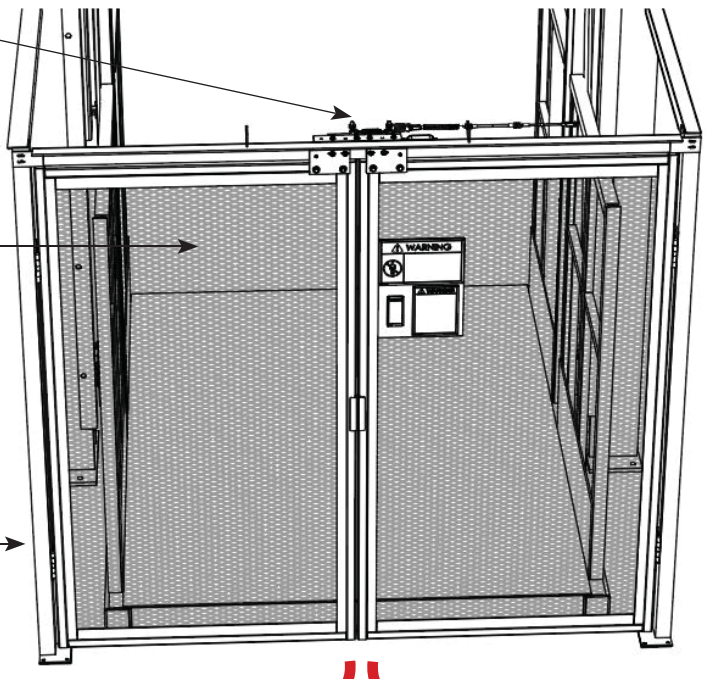
Interlock

Gate header

Gate panel

Bi-parting swing gate

Gate post







**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	24 VAC neutral - White
115 VAC - Red	24 DC - Blue
115 VAC neutral - White	0VDC - White/blue
24 VAC - Red/black	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. Drop cords (flexible cords) shall be multi-conductor festoon-type cable where applicable.



**Electrical Ruling Bodies**

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

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**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.
  - **JNFPA 79:** Electrical standard for industrial machinery.
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**Outdoor Application**

Outdoor VRCs 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.

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**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.

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**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).

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**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/flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixture.

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**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.

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**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.

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## Section 6 | Electrical Standards and Definitions



**MATERIAL HANDLING SOLUTIONS**

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



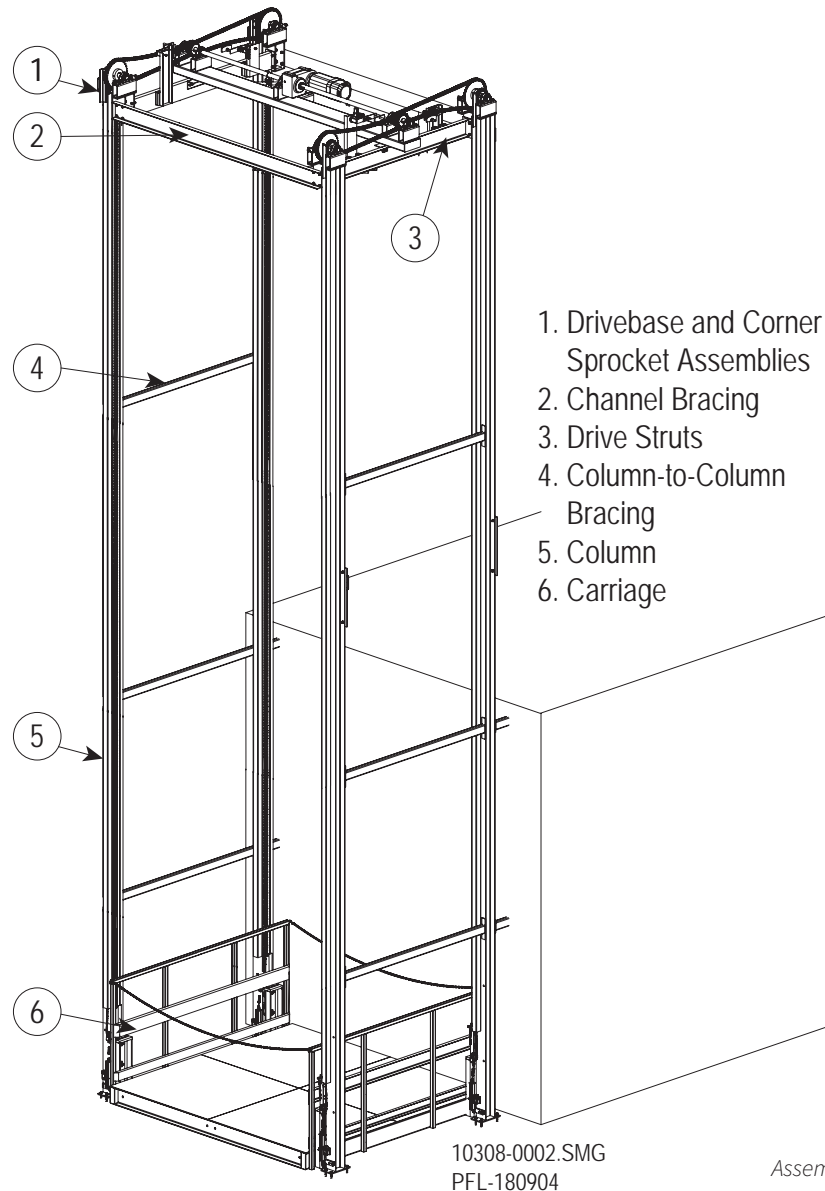
**Mechanical Overview**

Each Series F (mechanical) Vertical Reciprocating Conveyor (VRC) consist of four (4) columns, a drivebase assembly with a gearmotor reducer, drive shaft with four (4) corner lift sprocket assemblies, a moving carriage deck, and if furnished, interlocked safety gates or doors. See Figure 7-1. In addition, a main control panel, and one push-button station per level are furnished. For more information on the electrical components, see Section 8 in this manual.

**Lift Columns**

The frame for the Series F consists of four (4) vertical upright columns. These are anchored to the floor at the lower floor level, positioned by the drivebase at the top, and braced to the building structure. Exact bracing varies by application.

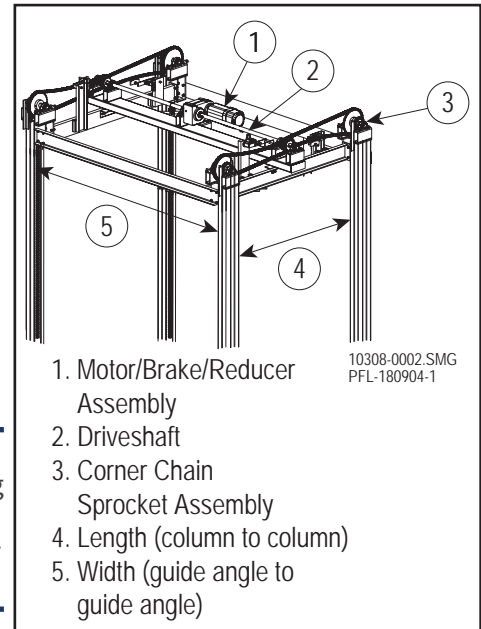
Each column has a guide angle welded to one flange of the column to form a track. A chain tube guard is welded to the face of the other flange.



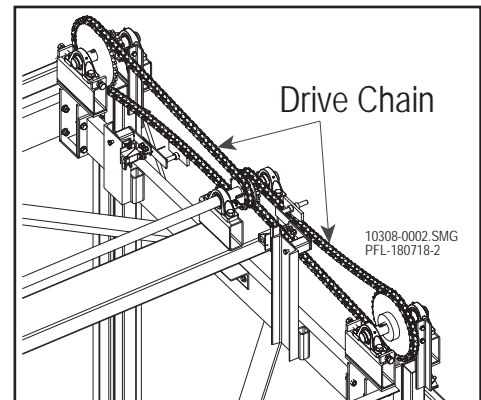
### Drivebase Assembly

The drivebase assembly consists of a motor, brake, gearmotor reducer (commonly referred to as a gear motor assembly), lift sprockets, a drive shaft, bearings, and a support structure. Roller chains connect the drive sprocket on the shaft of the drivebase assembly to the larger driven sprocket on the corner assemblies on top of each column. The lift chains connect to tensioner chains and chain tensioners complete the components. See Figure 7-2, Figure 7-3, and Figure 7-4.

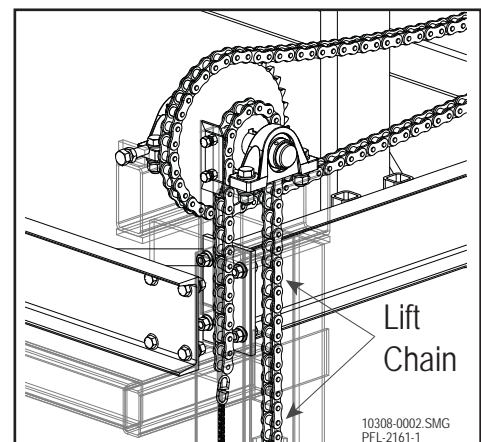
**NOTICE** This VRC uses special high strength chain. Do not use standard ANSI roller chain or connecting links as a replacement. Contact PFlow Industries, Inc. Product Support Department for the required chain specification.



Drivebase Assembly Figure 7-2



Drive Chain Figure 7-3



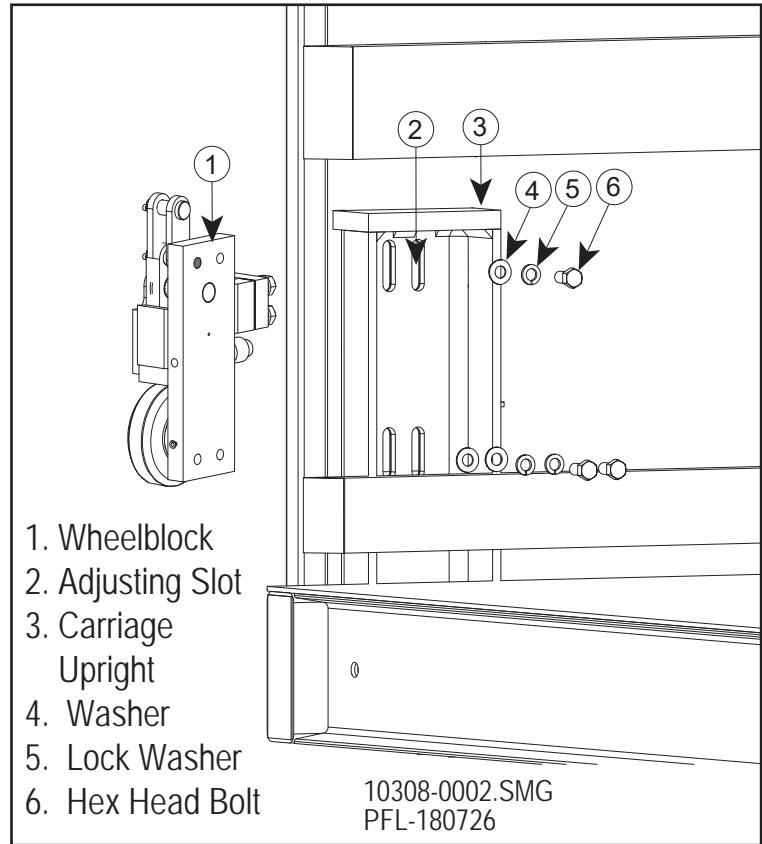
Lift Chain Figure 7-4



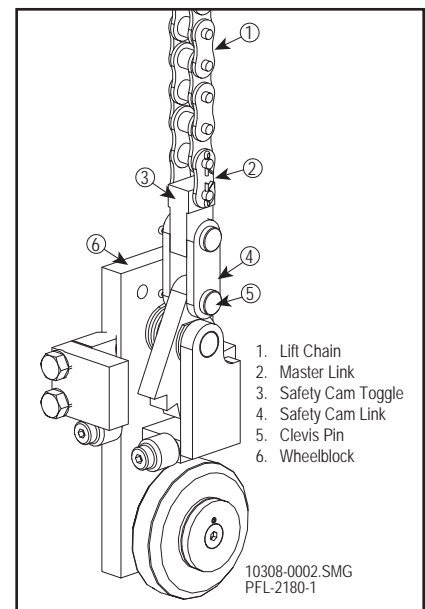
**Wheelblock Assembly**

Inside each of the four (4) columns, one end of a lift chain connects to a wheelblock assembly which is bolted to the carriage upright. This allows the wheels to ride within the lift columns and guide the carriage travel.

Each wheelblock has a mounting base block, a wheel, and two (2) guide rollers. The guide rollers locate the wheelblocks within the guide angle. Each wheelblock has a safety cam with teeth and a wheelblock shoe. The wheelblock shoe (bolted to the wheelblock base) fits around the outside of the column guide angle track while the steel safety cam is pivoted on the wheelblock mounting block. It is torsion spring-loaded. See Figure 7-5 and Figure 7-6.



Wheelblock Bolted to Carriage Figure 7-5



Lift Chain Attached to the Wheelblock Figure 7-6

**Lift Chains**

Inside each column, the ends of the lift chains connects to a wheelblock assembly which is bolted to the carriage upright.

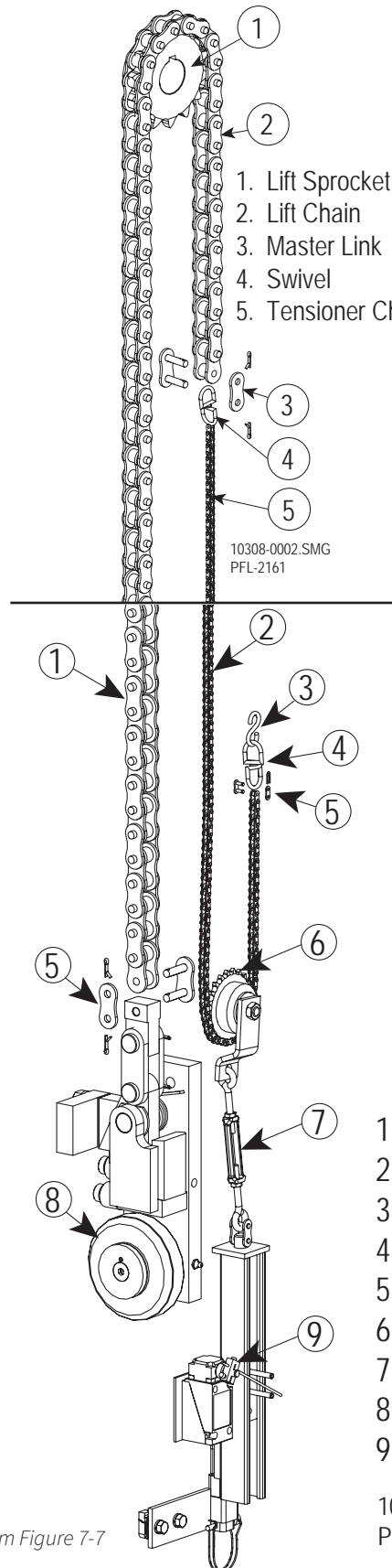
The lift chains goes up and over the lift sprocket at the top of the column drivebase assembly, then proceeds downward through the chain guard (chain tube), and connects to the smaller tensioner chain.

The tensioner chain then travels around the small chain tensioner sprocket and back up to the carriage to fasten to a bolt on the standoff on the carriage upright.

The tensioner sprocket is spring-loaded by the chain tensioner which maintains tension on the chain/ tensioner combination. If the lift chain is pulled too tight or becomes slack, the chain tensioner limit switch is activated to shut off power to the VRC.

The chain tensioner is adjusted at a turnbuckle on the chain tensioner assembly.

See Figure 7-7.



- 1. Lift Sprocket
- 2. Lift Chain
- 3. Master Link
- 4. Swivel
- 5. Tensioner Chain

- 1. Lift Chain
- 2. Tensioner Chain
- 3. S-Hook
- 4. Swivel
- 5. Master Link
- 6. Tensioner Sprocket
- 7. Turnbuckle
- 8. Wheelblock Assembly
- 9. Limit Switch

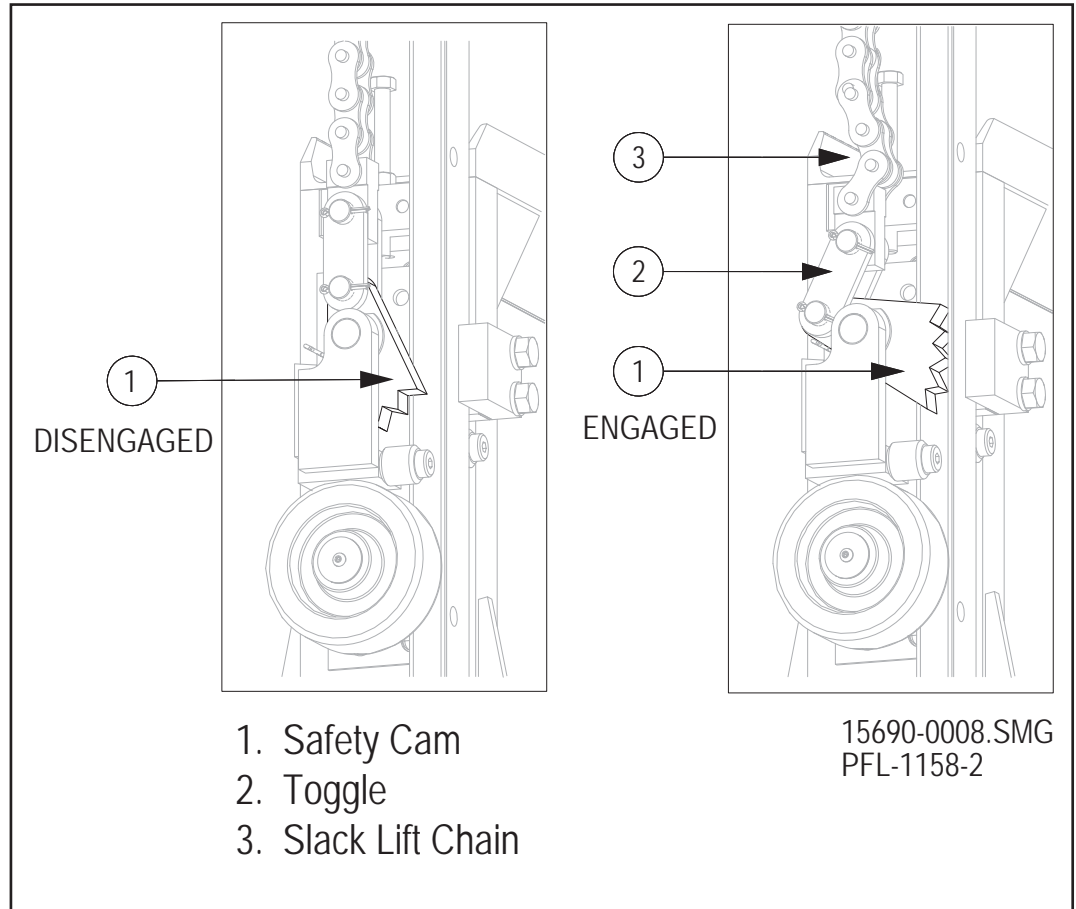
Lift Chain System Figure 7-7

10308-0002.SMG  
 PFL-1262-2



**Wheelblock  
 Safety Cam  
 Function**

If the lift chain breaks or becomes slack, the safety cam will pivot into a jam position with the column guide angle to stop the carriage from falling. The guide shoe on the outside of the guide angle track helps wedge the guide angle track wheelblock shoe and the safety cam teeth. See Figure 7-8.

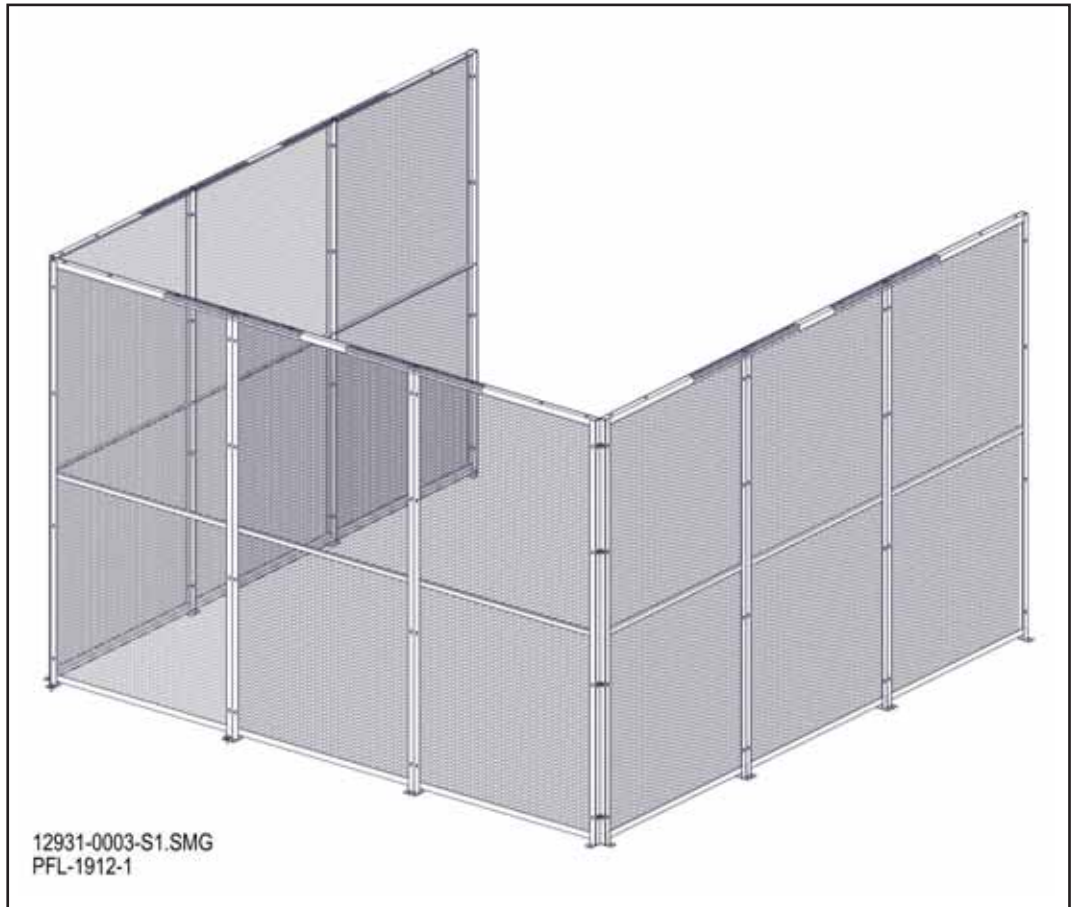


Wheelblock Safety Cam Figure 7-8



## Enclosures

In accordance with ASME B20.1, Section I-3.9, PFlow Industries, Inc. supplies standard 8' (2438mm) tall enclosure panels to be installed around the Vertical Reciprocating Conveyor (VRC) as required by site conditions. The enclosure panels are steel with 1-1/2" (38mm) angle frame and 16 gauge flattened expanded metal designed to reject a ball 2" (51mm) in diameter. PFlow Industries, Inc. standard enclosure panels are typically 8' tall (2438mm). Full height enclosures (FHE) are furnished when designed for site specific requirements. See Figure 7-9.



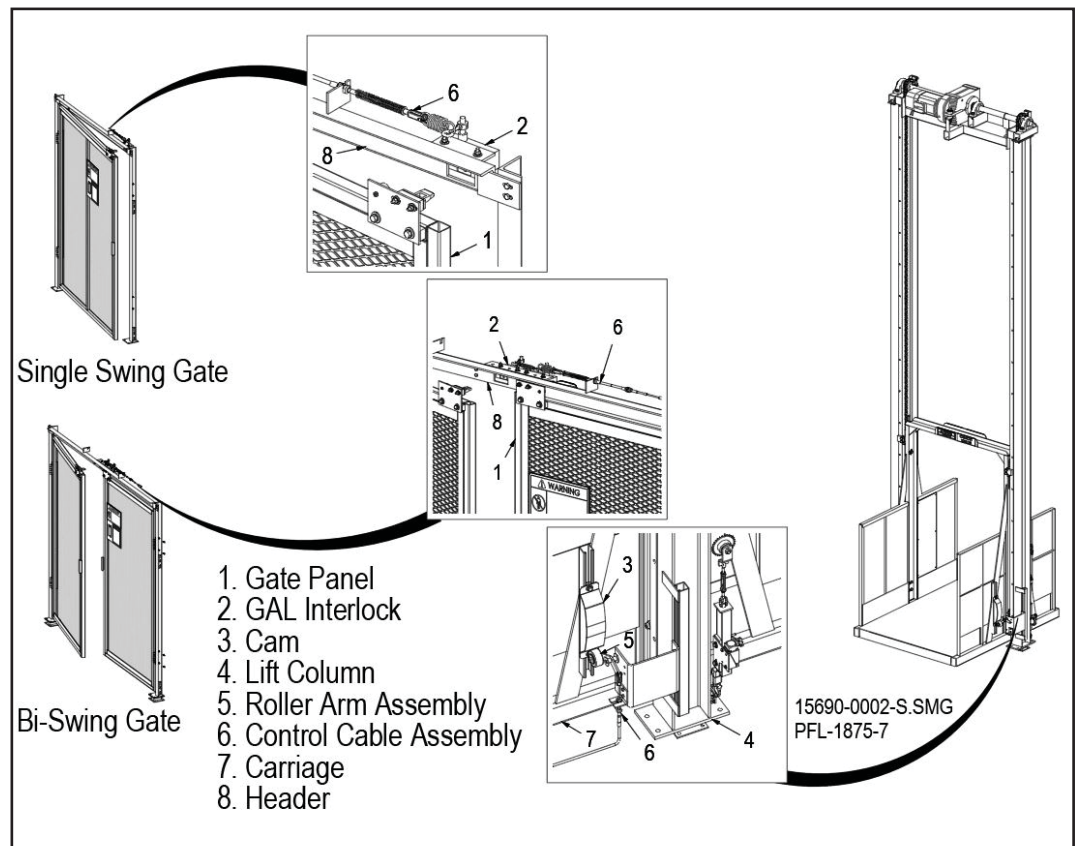
Floor Level Enclosures Figure 7-9

**Gate Assemblies**

A safety gate assembly or door is provided at each level opening accessing in the lift area. All gates and/or doors accessing the lift area are electromechanically interlocked. When a gate or door is open the interlock prevents movement of the carriage away from the respective level. When the carriage is not present at a level, opening the gate or door is prevented by the mechanical interlock. See Figure 7-10.

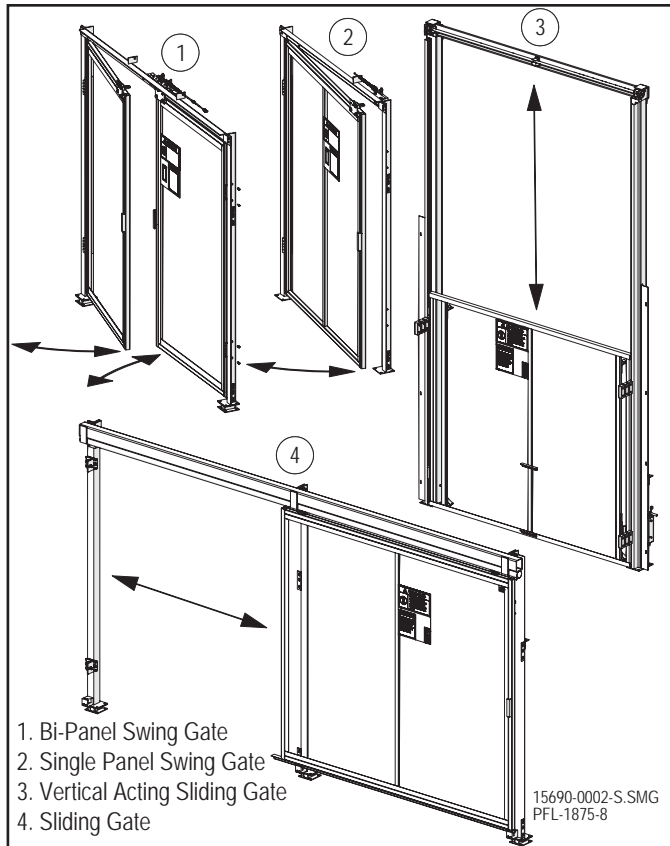
PFlow Industries, Inc. offers various styles of interlocks depending upon the gate type and application.

The parts section of this manual contains views with part numbers.

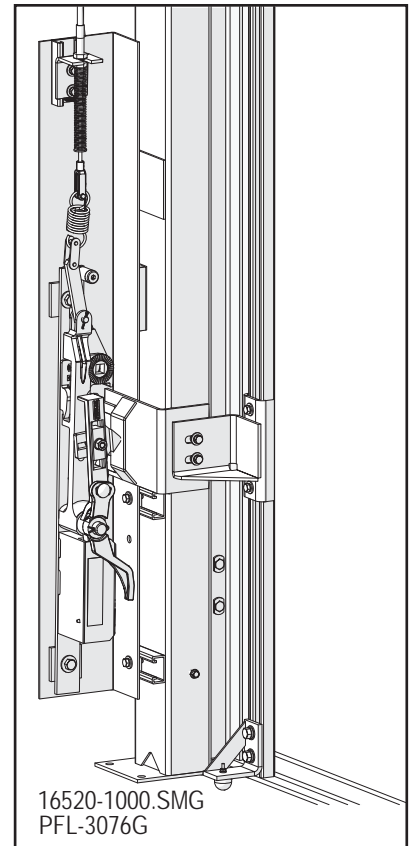


Swing Gate Interlock Examples  
 Figure 7-10

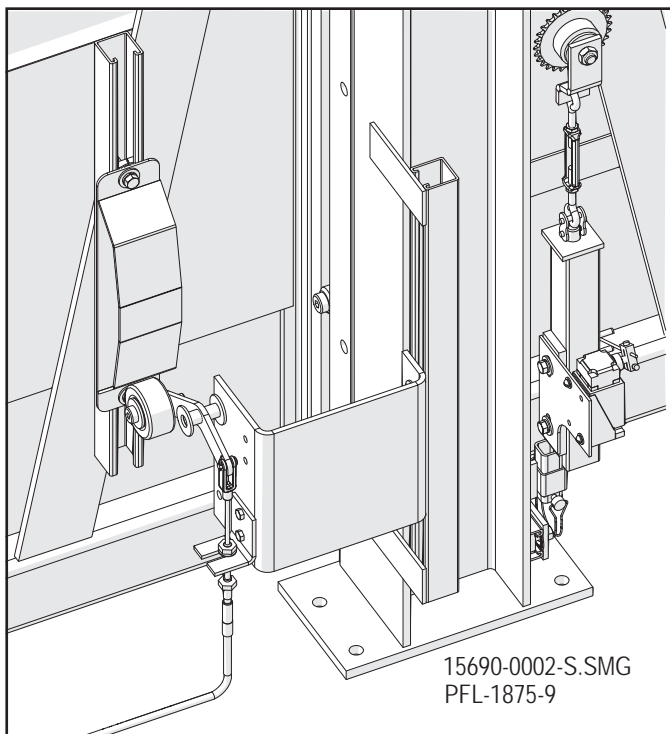
Examples



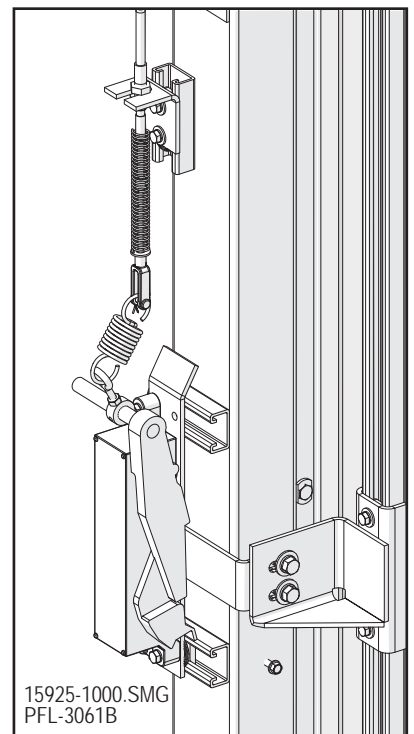
Swing Gate Interlock Examples Figure 7-11



Peelle - VAC Figure 7-12



Cable Actuator Figure 7-13



Anderson - VAC Figure 7-14



**Electrical Overview**

The following is a standard description of the electrical wiring of an F series VRC. This does not include any specifics on options available or ordered (e.g., gates, DeckLocks, photo eyes). 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 is open when the carriage is at the level and mechanical locks to lock the gate until the carriage is at that level.

**NOTE**

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

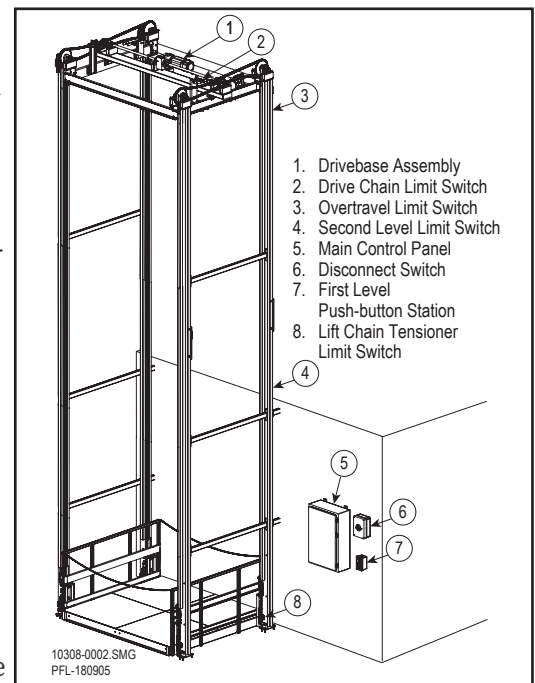
**Main Control Panel**

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 and current sensor is provided to protect the motor from excessive current draw.

**Push-button Stations**

One push-button station is normally supplied for each level. ASME B20.1 code requires that the push-button stations be remotely located and unable to be activated by someone standing 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.



Electrical Components Figure 8-1

**Main Disconnect Switch**

As required by NEC code, the main disconnect switch must be lockable and located within line of sight of the control panel and no more than 6' 6" (1981mm) off the floor.



---

### **Drivebase Assembly**

The motor / brake is located on the drivebase assembly. The motor and brake wiring must be verified prior to energizing the VRC.

### **Limit Switches**

The F series VRC has eight (8) limit switches incorporated into a standard two-level VRC: one (1) at each level to stop the carriage, one (1) overtravel, two (2) lift chain tensioner switches, and four (4) drive chain tensioner switches. All limit switches require field mounting and wiring. VRCs servicing more than two levels require two (2) additional limit switches for each intermediate level.

---

**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**

ASME B20.1 defines a qualified person 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**

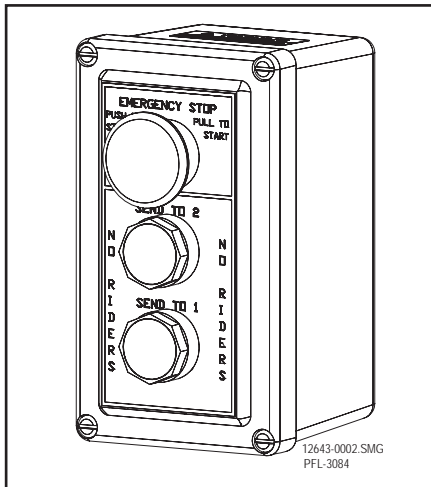
- Stay within the rated lift capacity.
- Make sure all safety devices are in place and operable before using the equipment. If any safety device is missing or inoperable, immediately remove the equipment from service.
- Falling hazard! Always make sure the carriage is present before walking through doorways.
- 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, physically secure the carriage with a maintenance pin, DeckLock system, chains, cables, or with a maintenance operation option for the platform.

** WARNING**

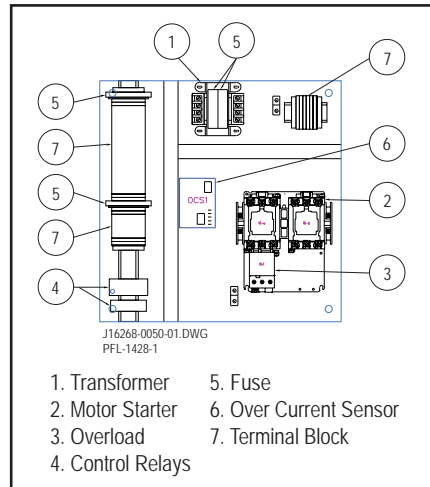
- Passengers are not permitted. Riding may result in death or serious personal injury.
- Allow only competent adults who have been properly trained in the safe use of this equipment to operate it.
- This equipment can be dangerous if not used properly. Allow only properly trained and authorized personnel to operate this equipment.
- Close all gates before the carriage is moved. Never leave the lift unattended with the gates in the open position. Never close gates when a person is on the carriage or within the fenced area.
- Place the load in the center of the lift platform to avoid shifting loads. Make sure that any portion of the load does not overhang the perimeter of the carriage. This could create an unstable load condition.

**Begin Sequence**

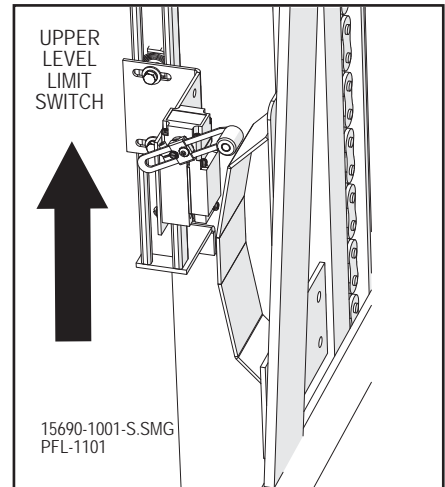
1. Press the desired floor level button. See Figure 9-1. The coil in the motor starter magnetically closes the high voltage contacts and the power circuit to the motor starter. See Figure 9-2. This action turns the motor in the needed direction.
2. The brake is released. The motor turns the gears in the reducer, which in turn rotates the keyed drive shaft. The drive sprockets on the shaft turn resulting in the raising or lowering of the lift chains. The lift chains are fastened to carriage wheelblocks, which are bolted to the carriage uprights. Adjustments to the wheelblock levels the carriage deck.
3. When the carriage arrives at the next level, the floor level limit switch is activated by a carriage mounted cam. See Figure 9-3. When the floor limit switch is activated, the switch cuts the power to the motor circuit. The motor starter contacts open, the motor stops, and the brake is applied. This stops and holds the carriage position.



Push-button Station Figure 9-1



Control Panel Example Figure 9-2

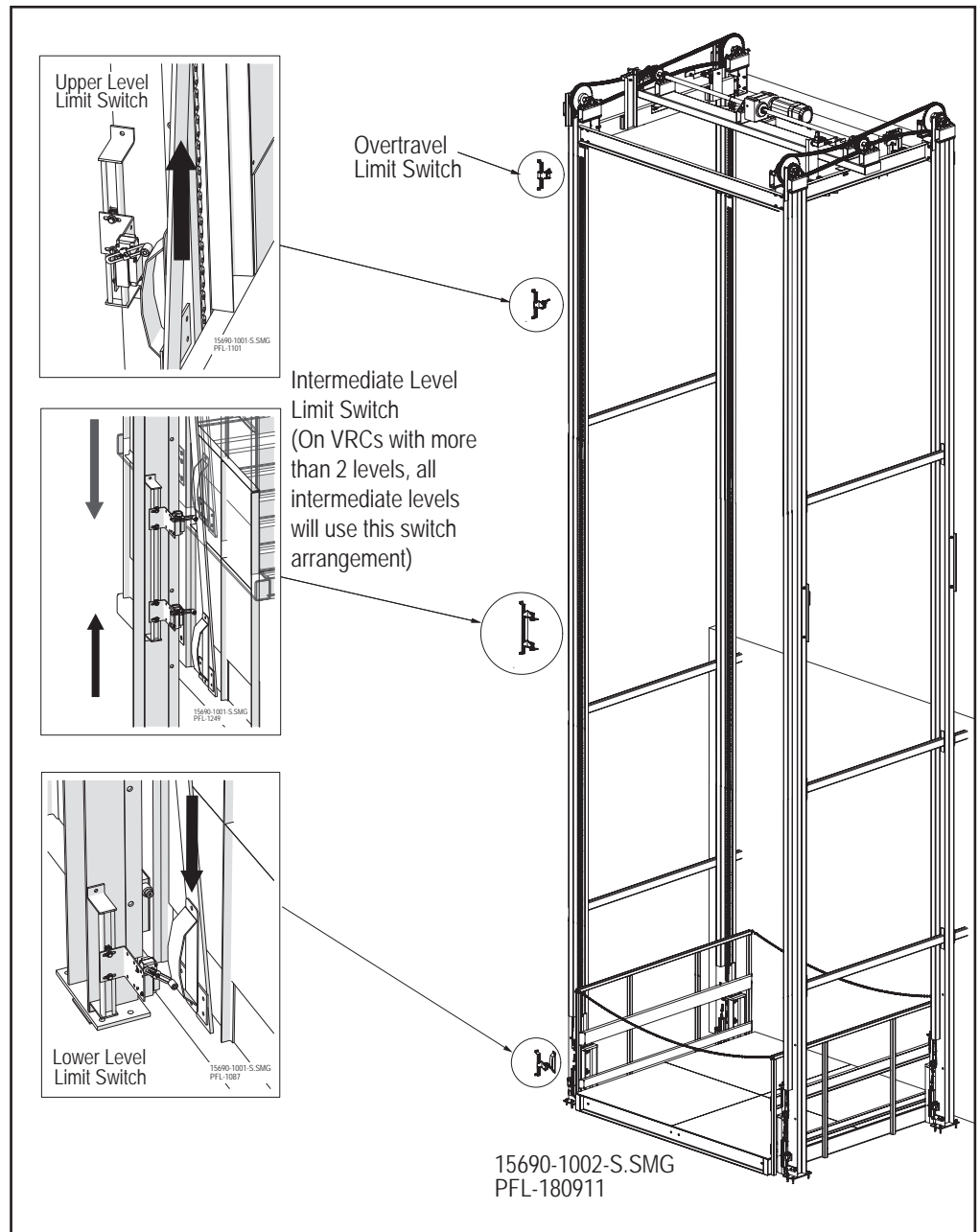


Limit Switch / Cam Figure 9-3



Sequence  
(continued)

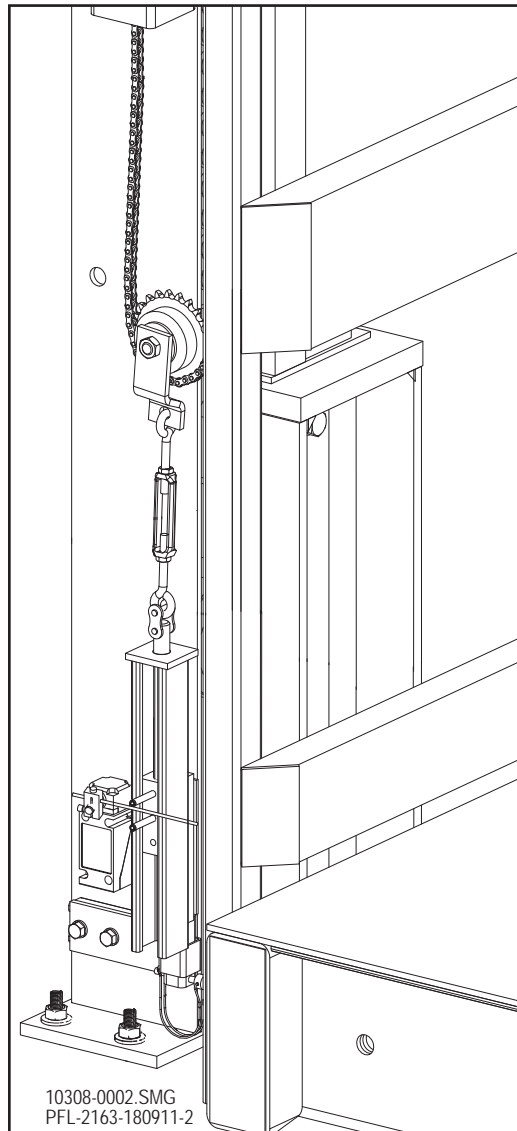
- The carriage overtravel limit switch is a safety device mounted on the column above the uppermost floor level limit switch. In the event of failure to activate the uppermost floor level limit switch, the overtravel limit switch is activated when it comes into contact with the carriage mounted wheelblock shoe on the side of the carriage. The switch cuts the power to the motor circuit. The motor starter contacts open, the motor stops, and the brake is applied. This stops and holds the carriage position. Before activating the VRC, have a qualified electrical controls technician investigate why the uppermost floor level limit switch failed and correct the problem. See Figure 9-4.



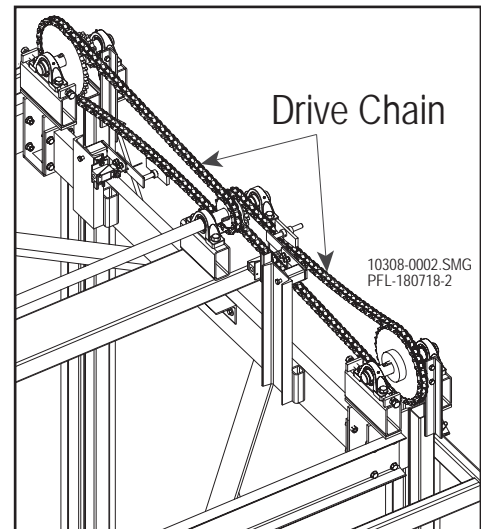
Limit Switch Figure 9-4

**Sequence  
 (continued)**

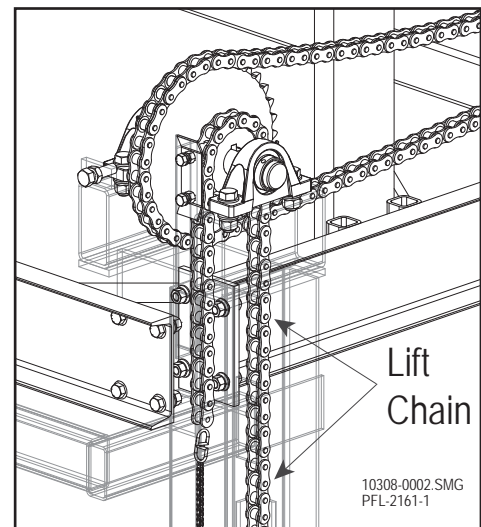
5. If there is excessive motor current draw that can cause motor overheating, the overcurrent sensor (OCS) in the control panel will protect the lift motor by cutting off the power to the control circuit. This will happen when the VRC is loaded beyond its rated capacity. See Section 15 for more information.
6. If the either of the drive chains or lift chains break or becomes slack, the sensor limit switch will activate to shut off power to the motor and apply the brake. The carriage will stop. The VRC will not operate until the chain is repaired and the chain sensor readjusted. See Figure 9-5 and Figure 9-6.
7. The lift chain tensioner limit switch is typically mounted at the bottom of the lift column. If both lift chains becomes slack or are broken, the chain tensioner limit switch will activate to shut off power to the motor and apply the brake. The wheel block safety cam will rotate and set on the column. The carriage will stop. The VRC will not operate until the lift chain is repaired and the chain tensioner readjusted. See Figure 9-6.



Lift Chain Tensioner Figure 9-6



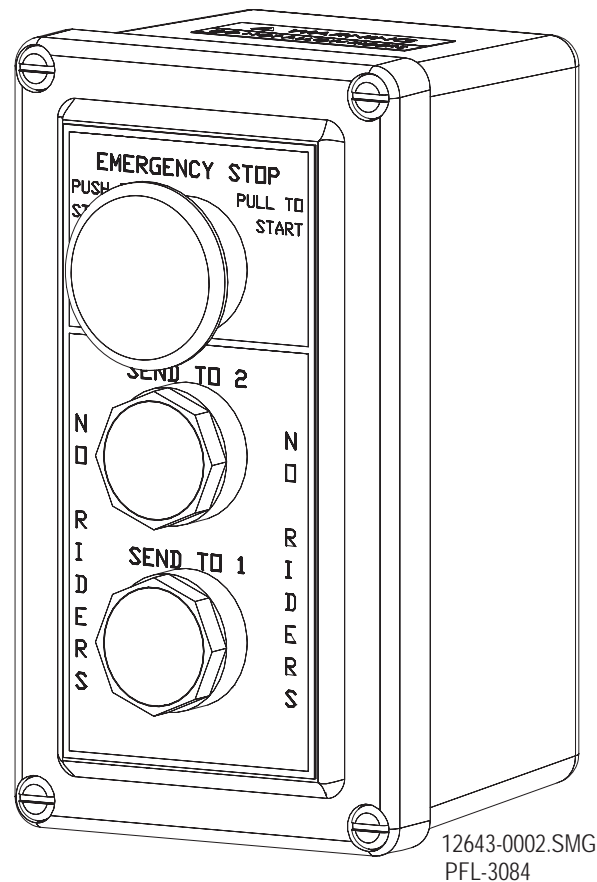
Drive Chain Tensioner Figure 9-5



Lift Chain Figure 9-7

### To Operate the Lift

1. Close all gates and make sure the gate latches are engaged.
2. Press the desired floor level button to move the carriage to the desired floor. The carriage will stop when the appropriate level is reached.
3. When the VRC arrives at the appropriate level and comes to a complete stop, open the gate.
4. If an emergency occurs when 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 9-8.



*Push-button Station Figure 9-8*



Eurodrive Reducer

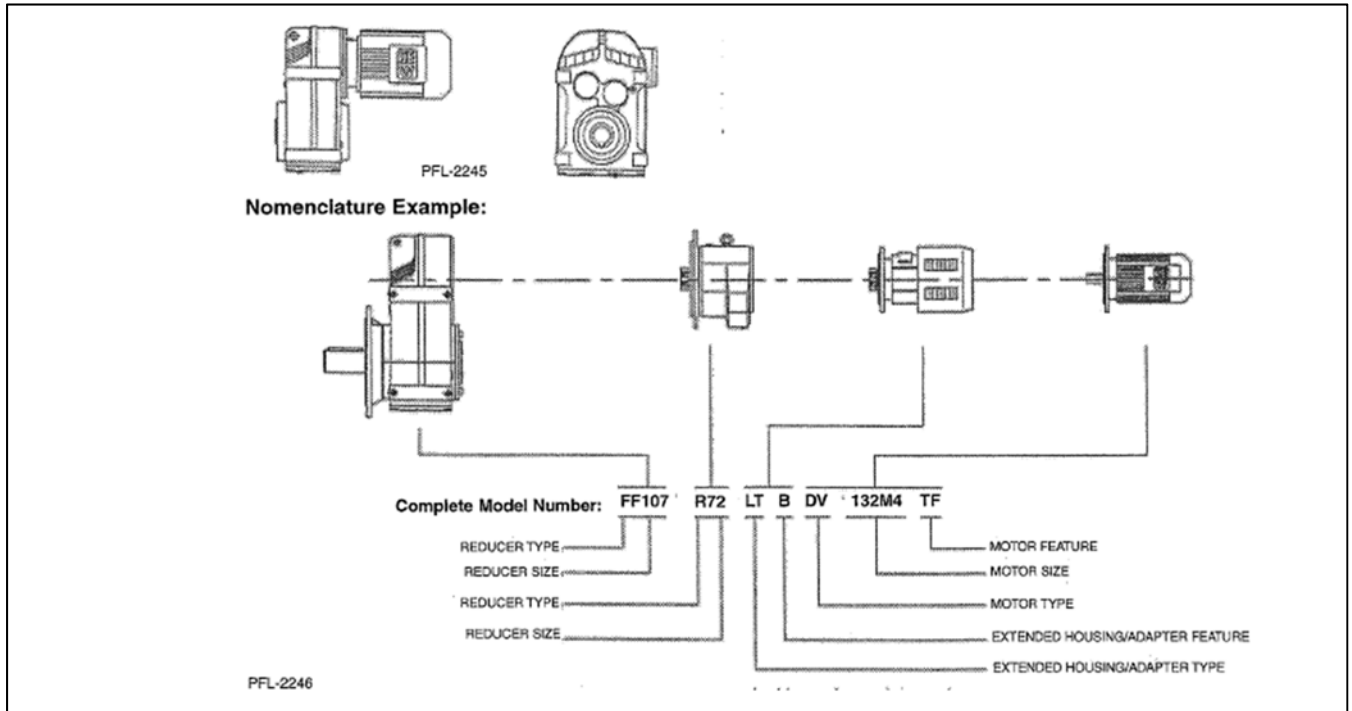


Figure 11 - 1

The SEW-Eurodrive model number consists of a series of letters to designate the type of unit or feature and numbers to designate the size of the unit. The model number always begins with the output side of the unit and ends with the input side. For use in our application, PFlow Industries, Inc. typically purchases only the following types:

- Helical Gear Unit Types – FA – Shaft Mount. Typically there are no additional features or extended housing/adapter types.
- Extended Housing Adapter Features: B – Disc Brake, HR – Manual Brake Release (self-engaging)
- Motor Types: DT, DV – AC Squirrel cage Motor
- Motor Features: BM, BMG – Disc Brake; HR – Manual Brake Release (self-engaging); TH – Thermostat Protection (used in inverter applications)

**! WARNING**

**Check oil level prior to operation!**

**NOTICE**

**Make sure the plastic stop in the vent plug is removed before operating the gear unit. This will ensure that no pressure buildup will take place inside the gear unit.**



### Oil Level

To check the oil level, remove the red painted screw plug. The level is correct when the surface of the oil is level with the lowest point of the tapped hole.

### Lubrication

Each gear unit is supplied from the factory with the correct grade and quantity of lubricant for the specified mounting position.

Dear Units	Type	Manufacturer	Ambient Temperature (C)
F..37-127	Mobilgear 629 (M)	Mobile Oil Co.	-15° to +25°
F..37-127	Mobil SHC 630 (S)	Mobil Oil Co.	-25° to +60°
F..37-127	Mobile SHC 629 (S)	Mobil Oil Co.	-30° to +50°

M = Mineral Oil; S = Synthetic Oil

Gear Unit	F..37	F..47	F..67	F..77	F..87	F..97	F..107	F..127
Mounting Position (H3)	0.29/1.1	0.45/1.7	0.85/3/2	1.66/6.3	2.96/11.2	5.42/20.5	7.40/28	12.94/49

### Maintenance

1. All oil levels and oil quality must be inspected every 5,000 hours of operation. If the oil is contaminated, burned, or waxed, change the oil immediately and flush out the box if necessary.
2. Under normal operating conditions, change oil every 10,000 hours of operation or two years.
3. When synthetic oil is used, change the oil every 40,000 hours or four years.

These suggested intervals are subject to change if the units are running in high temperature, high humidity, or corrosive environments.

### Storage

Motors must be stored in the normal position. Motors in storage or operated very intermittently must be run briefly at least once a month to protect the gears and seals by circulating the lubrication. For long term storage, motors should be completely filled with oil containing a rust preventative which is soluble in lubricating oil or drained of oil and cleaned with a rust preventative applied to the shaft, gears, and bearings. When taken out of storage for use, the gear motor must be cleaned and refilled with the proper oil.

#### Eurodrive Motor Information

The SEW-Eurodrive AC motors are designed for continuous operation under difficult operating conditions. They are supplied integral to a SEW-Eurodrive gear unit or as foot mounted or flange mounted design.

### Enclosures

The AC motors are provided as totally enclosed fan cooled (TEFC) in accordance with NEMA MG1-1.26.2-1993. They are also provided as an IP54 enclosure rating in accordance with DIN 40050 as standard or with IP55 or IP65 ratings as a modification.

### Bearings

The following chart lists the bearings for the appropriate motor frame sizes:

Frame Size	Driving End Side A		Fan End Side B
	Geared	Flanged and Footed	Geared, Flanged & Footed
DT71-80	6303 C3-2RS	6204 C3-2RS	6303 C3-2RS
DT90-100		6306 C3-2RS	6305 C3-2RS
DV112-132S	6307 C3-2RS	6208 C3-2RS	6307 C3-2RS
DV132MML-100M		6309 C3-2Z	6209 C3-2Z
DV160L-180		6312 C3-2Z	6213 C3-2Z
DV200-225		6314 C3-2Z	6214 C3-2Z

### Insulation Classes

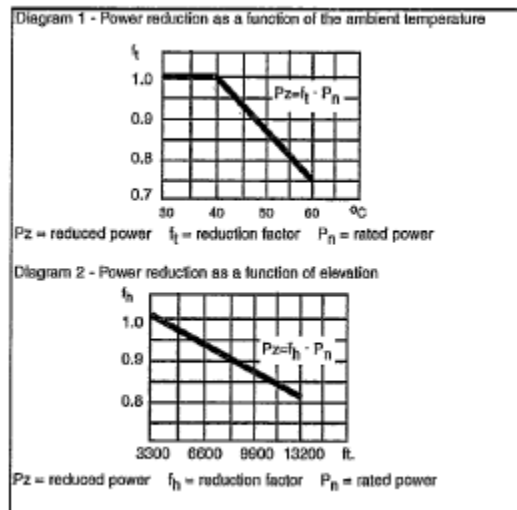
All single-speed and tapped-wound two-speed AC motors have Class B insulation as standard. Class F or Class H insulation can be provided as a modification.

### Supply Voltages and Frequencies

SEW-Eurodrive AC motors can be supplied suitable for operation on any voltage in the range of 200-660 volts. The standard voltages are 230/460V and 575V. The standard operation frequency is 60 Hz.

### Ambient Temperature and Altitude

The ratings of these motors are based on continuous operation at 40° C ambient temperature and a maximum elevation of 3,300 feet above sea level. For warmer ambient temperatures or greater installation heights, it is necessary to reduce the motor power rating per diagrams 1 and 2 below.









### SEW Eurodrive Brake Operation



15870-0003

This document is not a replacement for the SEW Eurodrive "operating instructions" - always refer to the SEW "operating instructions" for safety and installation information. Additional resource and information for the DR motor "be" brakes can be found at the [WWW.SEWEURODRIVE.COM](http://WWW.SEWEURODRIVE.COM) under the *technical notes* tab.

SEW EURODRIVE gearmotors are designed and manufactured with totally enclosed, fan-cooled, squirrel-cage induction motors which are designed for operation under difficult conditions. The windings are protected with a special insulating material, Class B or better. The brake motors incorporate a DC disc brake, and the supply is taken from a half-wave rectifier mounted inside the motor terminal box and an SR relay (when provided) mounted on the motor terminal box which switches DC power on and off.

The voltage to the brake must be applied and removed at the same time as the power to the motor.

1. Voltage to the rectifier energizes the brake coil and releases the brake.
2. Removal of the voltage to the rectifier de-energizes the brake coil and allows the brake to be applied.
3. The SR relay (when provided) switches the DC voltage to the brake coil, shortening the brake response time.
4. The AC voltage to the brake will be rectified to a DC level of 50% of the AC voltage supplied.

### Maintenance

The only maintenance normally required is to ensure the area between the cooling fins and the area through which the air is drawn in the fan guard is kept clean, the brake disc air gap is checked and that an audible check is made on the bearings. If the motor is being overhauled, the bearings must be cleaned and repacked. If the motor has to operate in moist or wet surroundings, then it is very important that upon reassembly of the motor, the end shield tenons are coated with a sealing compound such as Loctite.

### WARNING



Dangerous high voltage potential exists. Use extreme care when testing.

### WARNING

Do not work on this power unit without the platform secured or blocked in place.

### NOTICE

*Only a qualified controls electrician should work on the VRCs electrical circuits and within the main control panel.  
All instructions that involve electrical work apply to the electrician.*

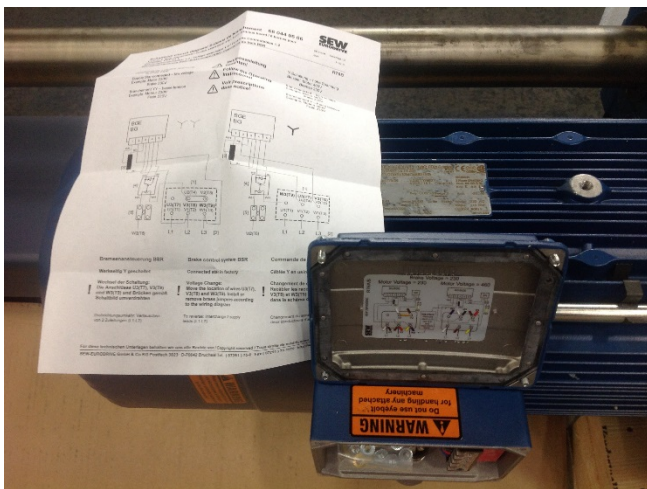


**BMG BRAKE SYSTEM OPERATION**

The BMG brake with a SR relay (when provided) is based on the fail-safe circuit principle. See Figure 11-1. The brake is released when the power is applied to the brake coil, and a spring applies the brake when power is removed. In case of a power failure, the brake still holds.

The brake coil consists of two coils. One coil is called the accelerator coil and the other is called the partial coil. When power is applied, the accelerator coil is energized, releasing the brake quickly. Shortly thereafter, the partial coil is switched on electronically (done internally by rectifier module) and placed in series with the accelerator coil. Both coils in series are used for holding. The two coils together use less power for holding; when power is removed from the brake, reaction time is shortened. To further increase braking speed and to eliminate wiring needed from the control panel to the brake, a SR relay is used. Units without a SR relay (motor junction box on the motor does not have the SR relay extending out the of the motor junction box side) must have the brake circuit wired from the control panel to the motor junction box.

**DR motor brake SR relay connection diagrams**



**Figure 11-1**

**Verify** your specific SEW Eurodrive connection diagram by locating the "Circuit Diagram" sheet located in the motor junction box. A specific motor connection diagram label is fixed on the inside of the motor junction box cover.

**See Figure 11-1**

Now available as an iPhone/iPad App!!! [CLICK HERE](#) for iTunes preview. HIDE

SO# (Serial Number) Information - USA (For info on units not from USA click here)

SEW-EURODRIVE, INC. USA SE W

SO# 850018425.02.02.001 → 850 . . . .

Part: 6500    Part: 6500    Part: 6500

Rev: 0.0    Rev: 6.460    Rev: 6.460

Rate: 110.40    Rate: 1.3    Rate: 1.3

Model: B3A

Mount: FCBL1GEAR 636    0    V+4C 3

Part: 6500    Part: 6500    Part: 6500

SO#	
Model/Type	
Gear Ratio	Motor HP
Output Speed	Motor Voltage
Mtg Position	Frequency
Shaft Diameter	Connection
Flange Diameter	Motor Amps
Conduit Box Loc	KVA Code
Cable Entry	Insulation Class
Out Torque (lb-in)	Brake Rectifier
Gear S.F.	Brake Voltage
Other	

With the SEW Eurodrive SO# (on motor nameplate) the SEW website will indicate the connection diagram number (i.e. connection R72B)



15870-0005

The QR code (15870-0005) links to the SEW Eurodrive SO# lookup page.

[http://www.seweurodrive.com/s\\_ptipilot/so\\_information.php5](http://www.seweurodrive.com/s_ptipilot/so_information.php5)

Section 11 | Eurodrive Brake Operation and Maintenance

**SR RELAY WIRING (WHEN USED)**

BSR control: combination of the BG or BGE rectifier and the SR relay. Used for fast brake action without additional customer supplied wiring or contacts.

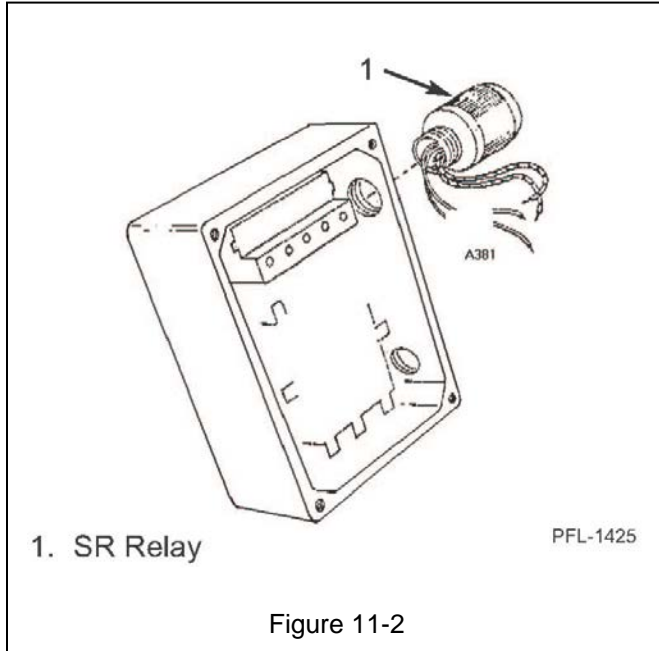


Figure 11-2

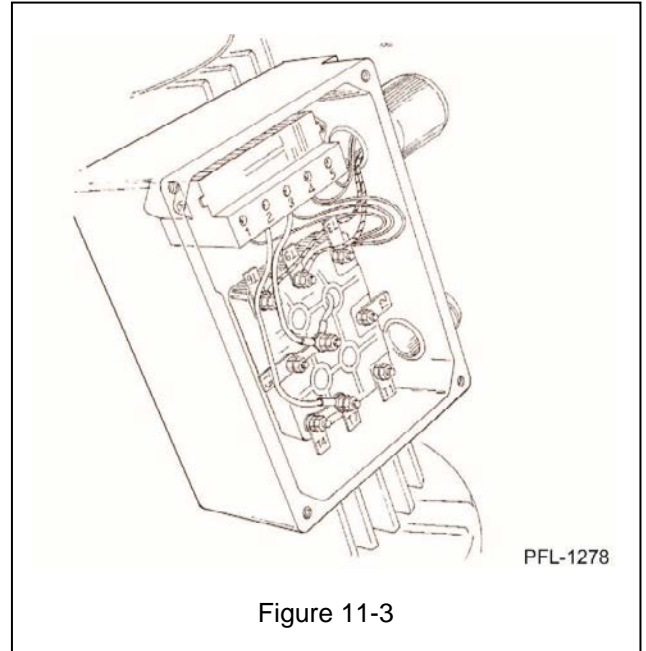


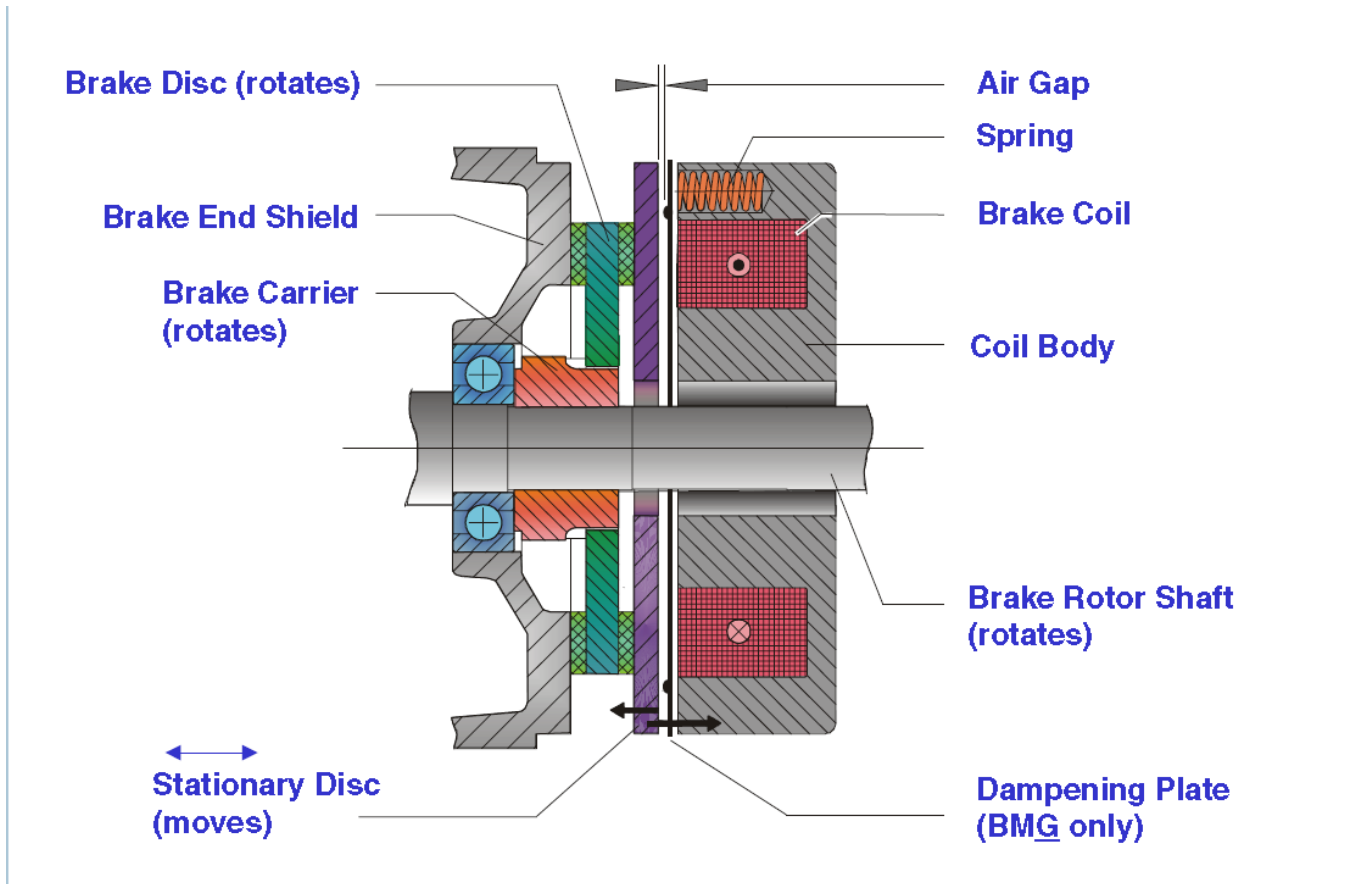
Figure 11-3

**Troubleshooting**

Fault	Cause	Solution
1. Brake does not disengage.	<ol style="list-style-type: none"> <li>1. Wrong voltage on the rectifier module.</li> <li>2. Rectifier has failed.</li> <li>3. The maximum permissible air gap due to brake line wear.</li> <li>4. Voltage drop in the high voltage connection.</li> </ol>	<ol style="list-style-type: none"> <li>1. Apply correct voltage (check the motor/brake nameplate).</li> <li>2. Replace rectifier.</li> <li>3. Readjust brake. If brake lining is completely worn out, replace the disc brake.</li> <li>4. Ensure correct line voltage.</li> </ol>
2. Motor does not brake.	<ol style="list-style-type: none"> <li>1. Brake lining is completely worn.</li> <li>2. The air gap has increased to a point where the adjusting nuts are run up tight.</li> <li>3. The hand brake is not properly adjusted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace brake disc.</li> <li>2. Reset brake.</li> <li>3. The adjusting nuts must be properly adjusted.</li> </ol>
3. Braking action is too slow.	<ol style="list-style-type: none"> <li>1. The brake is actuated with the normal brake action circuit.</li> <li>2. SR relay defective.</li> <li>3. During reassembly, the brass shims were omitted.</li> </ol>	<ol style="list-style-type: none"> <li>1. The brake is to be actuated with fast brake action circuit.</li> <li>2. Replace the SR relay.</li> <li>3. Install the brass shims.</li> </ol>



### BRAKE COMPONENTS



### NOTICE

#### For SEW Eurodrive brake only!

See the manufacturer's "Brake Service and Maintenance" information prior to working on the brake.



15870-0006

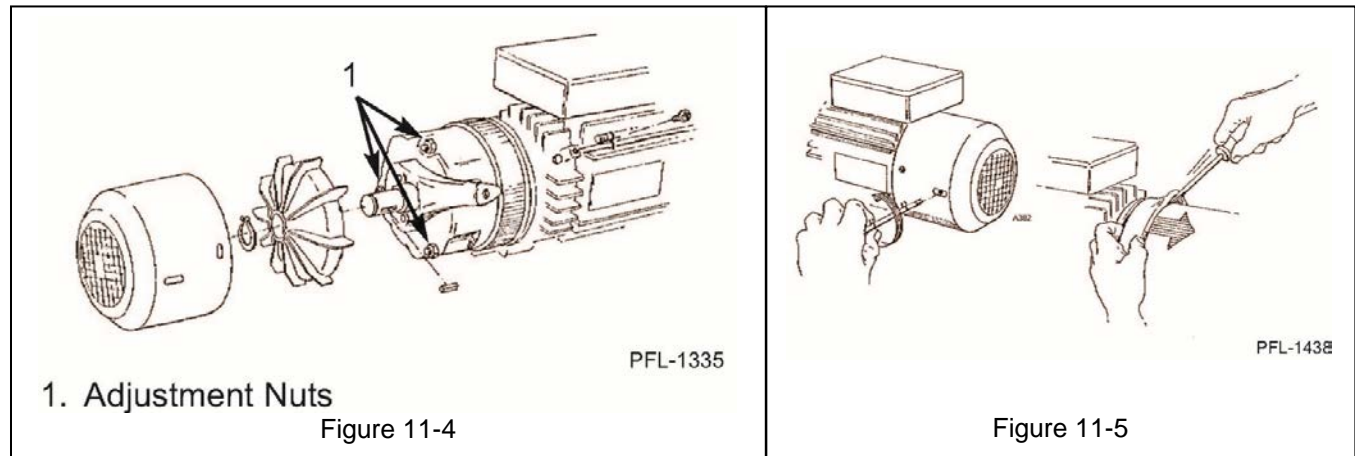
[http://www.seweurodrive.com/s\\_admin/inc.training/files/Brake\\_Service\\_and\\_Maintenance.pdf](http://www.seweurodrive.com/s_admin/inc.training/files/Brake_Service_and_Maintenance.pdf)

## ADJUSTING BRAKE AIR GAP

NOTICE

Air gap is factory set. Adjust only after consulting factory.

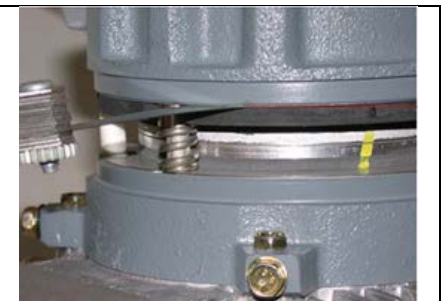
1. Remove cover and fan.
2. Tighten the three brake adjustment nuts lightly. **See Figure 11-4 and Figure 11-5.**



3. Slide the rubber seal to the side to expose the stationary disc and brass shim.
4. Loosen the three brake adjustment nuts until the correct brake working air gap is obtained between the shim and stationary disc. See the table below for the correct air gap. Also refer to Figure 11-6 and Figure 11-7 on the next page.
5. Any adjustment to the air gap will also affect the play in the manual release.
6. Since the stationary disc will move away from the coil body during the brake's operation, it is vital that there is free play (floating clearance) on the release arm of 0.060"-0.080" (1.5-2.0 mm). The springs should be placed between the arm and the nuts to eliminate noise.

Motor Size	Brake Size	Air Gap
DT71 - DT100	BM(G)05 - BM(G)4	0.010"-0.024" (0.25-0.6 mm)
DV112 - DV225	BM(G)8 - BM31	0.012"-0.047" (0.3-1.2 mm)
DV180 - DV225	BM32-BM62 Double Disc	0.016"-0.047" (0.4-1.2 mm)
DV250 - DV280	BMG61	0.012"-0.047" (0.3mm - 1.2mm)
	BMG122 Double Disk	0.016"-0.047" (0.4mm-1.2mm)

**Table 1**





**NOTICE**

**Adjustments to the air-gap must be made evenly.  
Adjust each nut and recheck adjustment once the final gap has been set.**

**NOTICE**

**There must always be clearance on the release arm lever.  
The brake release mechanism is not used to change the brake's torque setting.**

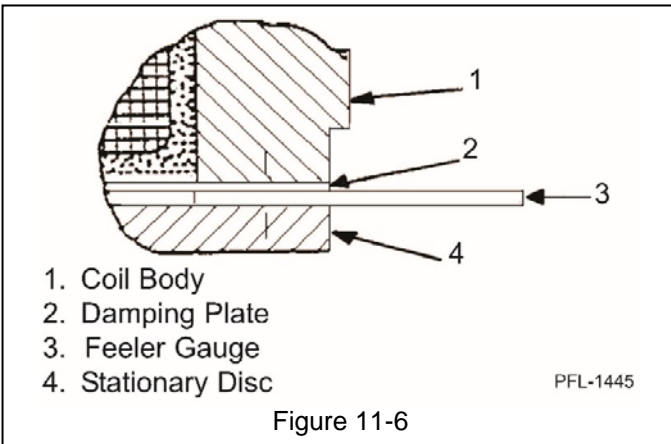


Figure 11-6

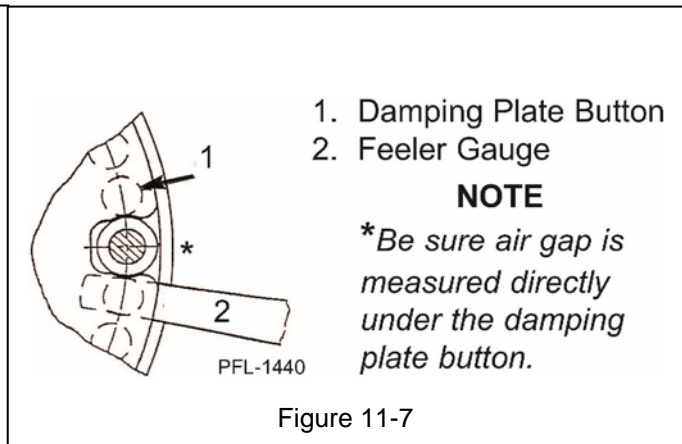


Figure 11-7

**Brake Disc Inspection**

1. Remove cover and fan.
2. Slide rubber seal back to expose brake disc. **See Figure 11-4 and Figure 11-5 on the previous page.**

**Hand Release Mechanism**

Most brakes are supplied with a hand operated release lever allowing the operator to open the brake without applying power to make adjustments on the driven machinery.

The “BMHR” 4-type requires a lever to be inserted into the release arm. To open the brake, pull the lever away from the motor. Brake will re-engage automatically when the lever is released. The lever, when not used, is attached to the motor’s cooling fins with clamps.

Since the stationary disc will move away from the coil body during the brake’s operation, it is vital that there is free play (floating clearance) on the release arm of 0.060” – 0.080”. The springs should be placed between the arm and the nuts to eliminate noise.

**NOTICE**

**The brake release mechanism is not used to change the brake’s torque setting. There must always be clearance on the lever.**

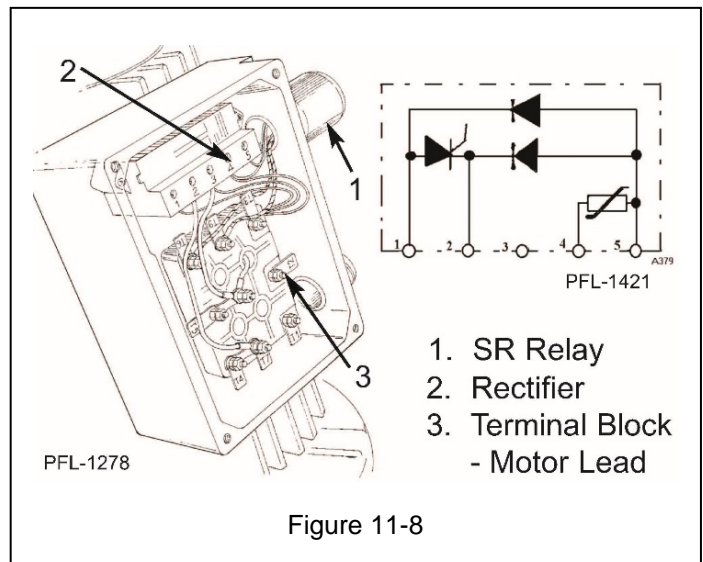
**Testing Brake Rectifier**

**⚠ WARNING**

**To prevent electrical shock, be sure to disconnect the power to the brake circuit before attempting to service or repair.**

The BGE rectifier module, due to its internal construction, cannot be checked thoroughly with an ohmmeter. You can only check to see if any internal parts are damaged to an open state, which would show an infinity reading on the meter.

1. Identify as BGE style (red cover).
2. Remove all wires from the terminal strip of the rectifier.
3. Set meter range to K Ω.
4. Check for opens between all terminals. An extremely low resistance reading may indicate a defective rectifier.
5. To isolate the brake problem to the rectifier module as potentially defective, it may be necessary to replace or check voltages on the rectifier to see if it is functioning properly.



**⚠ CAUTION**

**Before replacing the rectifier module, determine the cause of the failure to prevent damage to the replacement module.**



---

**Notes**





## 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.







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. Product Support Department via e-mail to [psd@pflow.com](mailto:psd@pflow.com)

**NOTICE**

ASME B20.1 defines a qualified person 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 on electrical components. 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 VRC parts must comply with all relevant health and safety directives and regulations.
- Close all gates before the carriage is moved. Never leave the lift unattended with the gates in the open position. Never close gates when a person is on the carriage or within the fenced area.
- Entanglement hazard! Secure long hair, wear snug-fitting clothing, and avoid wearing jewelry while using the VRC.

## Section 13 | F Series Preventive Maintenance and Schedule Checklist



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✓	Action	How Often
	Verify overall operation.	monthly
	Verify that all level stops are flush with the floor level. Adjust as necessary.	monthly
	Verify that all areas under and around the VRC are clean.	monthly
	Verify that all gates and interlocks are functioning properly.	monthly
	Verify that all electrical components are undamaged.	monthly
	Verify that all gates and enclosures are undamaged and properly installed.	monthly
	Verify that all push-button stations and e-stops are functioning on each level.	monthly
	Identify any unsafe condition. Document and report the condition immediately to the customer and then PFlow Industries, Inc. Product Support Department. Do not allow the lift to operate when unsafe conditions arise.	monthly
	Verify that all nuts and bolts are tight. Adjust as necessary.	3 months
	Verify that all moving components are functioning properly.	3 months
	Inspect and lubricate all chains (e.g., lift, drive, tensioner, gate) with non-detergent, petroleum-based SAE 30 oil. Inspect for wear, rust, bent, cracked, or binding links.	3 months
	Inspect limit switches and operation. Adjust as necessary.	3 months
	Verify that the lift chain sprocket position is centered over the chain tube. Adjust the position if necessary. Tighten and torque setscrews.	3 months
	Verify that the drive sprocket position is aligned with the face of the column sprocket. Adjust the position if necessary. Tighten and torque setscrews.	3 months
	Inspect all additional options and accessories (e.g., DeckLocks, maintenance pins) and operation. Adjust as necessary.	3 months
	Inspect the wheelblock guide rollers for rotation interference and wear.	3 months
	Verify that all electrical connections are tight.	3 months
	Verify that all tensioners are properly adjusted. Adjust as necessary.	3 months
	Verify that the carriage is level. Adjust as necessary.	6 months
	Inspect all welding, bracing, and anchoring for structural integrity.	6 months
	Inspect all chain sprockets for wear.	6 months
	Grease the pillow block bearings on the drivebase with lithium axle grease. Add Loctite Blue #242 to the setscrews and tighten.	6 months
	Inspect the motor and brake. Measure and record the air gap on the brake.	12 months
	Remove the wheelblocks. Inspect the wheelblocks and safety cams for deterioration.	12 months

### Additional Notes or Follow-up Requirements

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

**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**

ASME B20.1 defines a qualified person 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 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.
- 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, maintenance pins, DeckLocks, or straps with shackles around the drivebase 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, gate panels, enclosure panels) that may fall during the troubleshooting process.
- Secure all VRC access areas (e.g., gates, push-button stations) before any troubleshooting or service is begun. 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 following table identifies some of the most common issues with the VRC, the possible causes, and the suggested solution.

Malfunction	Possible Cause	Solution
<b>Push-button controls do not start the motor.</b>	The emergency stop is pushed in.	Pull the emergency stop out.
	Gates or doors are open or ajar.	Verify that all gates and doors are closed.
	Proofed diagonal drop bar on the carriage is up.	Lower the drop bar into position.
	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 tensioner chain.	Tighten the chain or adjust the chain tensioner or chain sensor.
	Broken tensioner chain.	Repair or replace as needed.
<b>Motor starts and carriage raises, but motor stops before the second level.</b>	Gates or doors are open or ajar.	Close the gate or 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 lift chain or tensioner chain.	Tighten the chain or adjust the chain tensioner or chain sensor.
	Broken tensioner chain.	Repair or replace chain as needed.



Malfunction	Possible Cause	Solution
<b>Lift motor starts for two seconds and stops.</b>	Overcurrent sensor or motor overload trips.	Lighten the lifted load.
<b>Carriage fails to stop at floor level.</b>	Floor level limit switch is inoperable.	Adjust, repair, or replace the floor level limit switch.
	Brake inoperable.	Determine cause and effect. Repair if needed.
<b>Carriage raises but will not lower.</b>	Safety cam has set.	Identify the problem and repair as needed.
<b>Carriage lowers but stops early.</b>	Debris in the pit.	Remove debris from pit and clean the area.
<b>Rough or noisy operation.</b>	Interference between the chain and chain guards or chain guides.	Determine the cause and correct.
	Shaft pillow block bearings are worn or dry.	Inspect, lubricate, and replace as needed.
	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.
	Wheel guide rollers are worn.	Inspect and replace as needed. Determine the cause and correct.
	Wheelblock guide shoe is rubbing on main beams.	Determine the cause and correct.
	Chain tensioner sprocket bushing is worn or corroded.	Inspect and replace as needed.
<b>Motor hums but shaft does not rotate, then thermal overload trips.</b>	Single phasing.	Use a voltmeter to ensure the incoming main leads are wired properly. Repair as needed.







**Before You Begin**

*Read this entire manual.*

**Overcurrent Sensor (OCS) Purpose**

The PFlow Industries, Inc. Vertical Reciprocating Conveyor (VRC) is equipped with an Overcurrent Sensor (OCS). The OCS is pre wired and located inside the electrical control panel. See Figure 21-1.

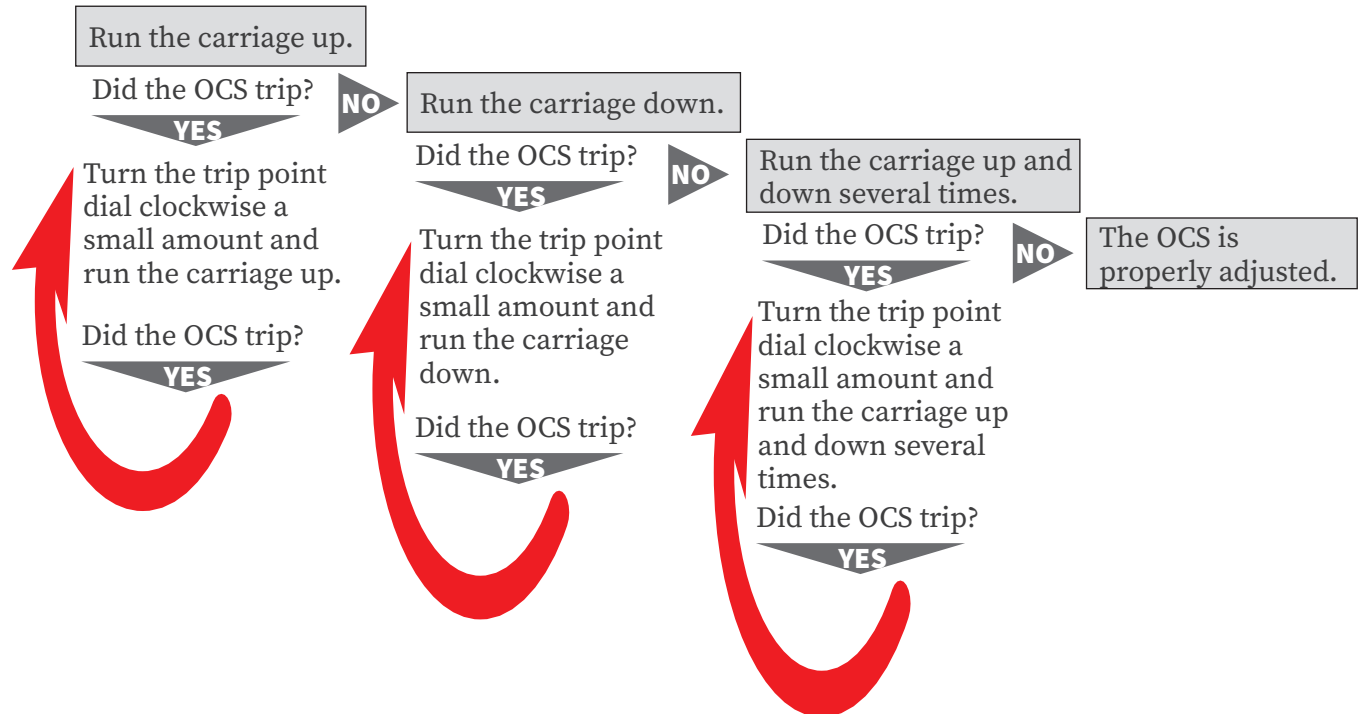
The OCS monitors the motor amp draw and provides enhanced over current protection of the lift motor. The OCS must be adjusted to the maximum “expected” current draw. If the motor current rises above the OCS set point, the OCS will trip. Tripping can be caused by a circuit malfunction, overloading the capacity of the lift, or an overhanging load trapped between floors.



Overcurrent Sensor Figure 21-1

**Test and Calibrate the OCS**

1. Turn the trip point dial to its lowest position.
2. Place the maximum product load on the carriage.



## Section 15 | Adjust Overcurrent Sensor



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## Section 16 | Recommended Spare Parts F Series



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This recommended spare parts list is generic (not specific to your unit). Part numbers are deleted due 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, they could put the VRC out of service.

Description	Quantity	Part Number
<b>Wheelblocks (refer to Bill of Materials in Owner's Manual)</b>		
Wheel Assembly, Steel, 5 1/4	4	6381-0001
Roller, 1.25 OD Guide Plastic	8	5221-0000
Bolt, Shoulder, 5/8 x 1 1/4	8	5874-0020
<b>Push-button Stations (refer to Bill of Materials in Owner's Manual)</b>		
PB Station, 2-LVL, 22mm	1	13675-0002
Emergency Stop (E-Stop)	1	13692-0014
Operator Push-button Black Flush	1	13690-0003
<b>General</b>		
Paint 13 oz. PFlow Blue Aerosol Spray	1	2871-0003
<b>Electrical Components</b>		
Fuse, 0.8A, 600V, Class CC, Time Delay	5	8953-0007
Fuse, 1A, 250V, Time Delay	5	9448-0008
Fuse, 2A, 250V, Non-Time Delay	5	5992-0007
<b>Chains and Chain Tensioners</b>		
S Hook	4	3715-0000
Swivel Round Eye Double	4	7651-0000
Link, Master, #35, SBR	4	7938-1001

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. Product 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.

**Section 16 | Recommended Spare Parts  
F Series**



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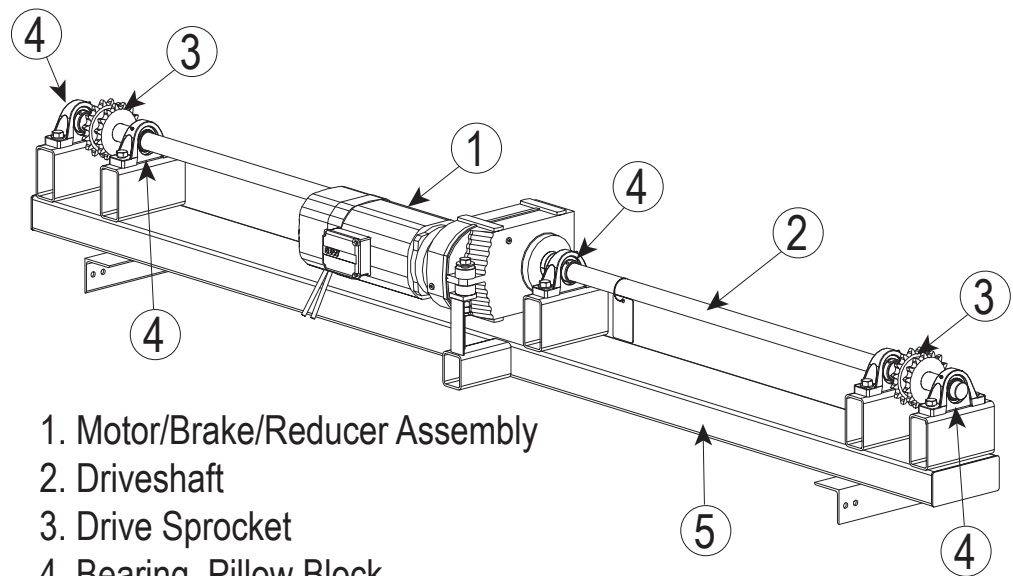


**Before You Begin**

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.

**Drivebase Assembly**

These are custom-designed components and vary by job. To ensure correct replacement components are used, consult the PFlow Industries, Inc. Product Support Department for proper part numbers. Please send a photo of the SO number from the reducer assembly and have the PFlow serial number available when requesting this information.



- 1. Motor/Brake/Reducer Assembly
- 2. Driveshaft
- 3. Drive Sprocket
- 4. Bearing, Pillow Block
- 5. Drivebase Weldment

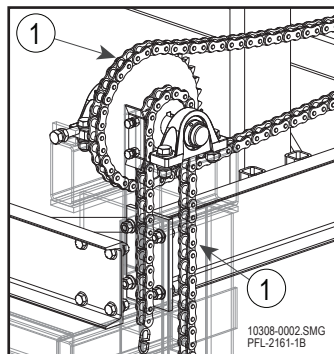
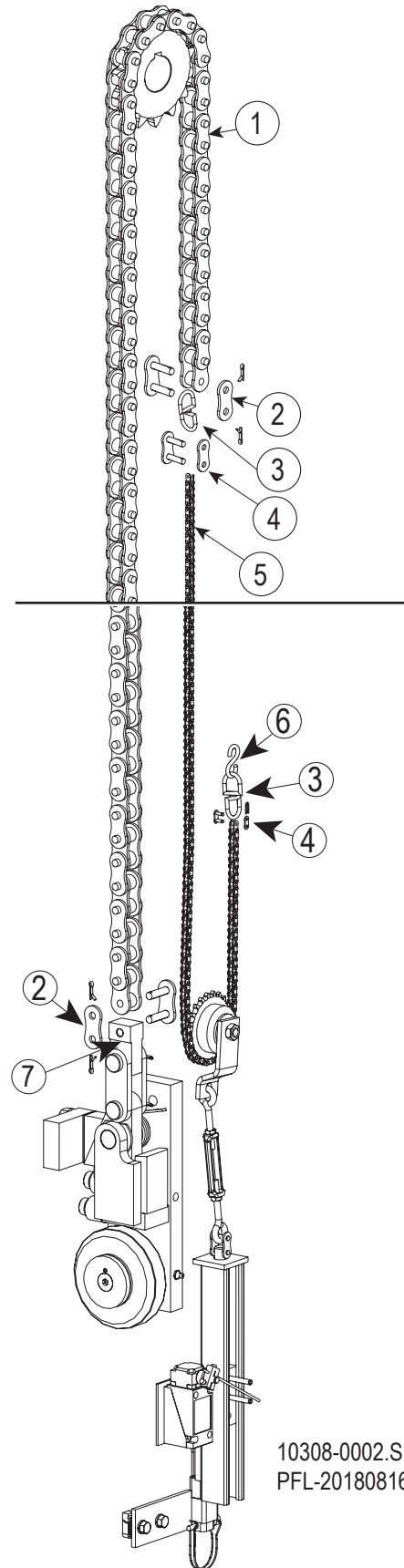
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**Chain Arrangement**

The following drawings illustrate the path of the lift chain and tensioner chain. **The size of the drive and the chains vary by application. Consult PFlow Industries, Inc. Parts Department before ordering.**

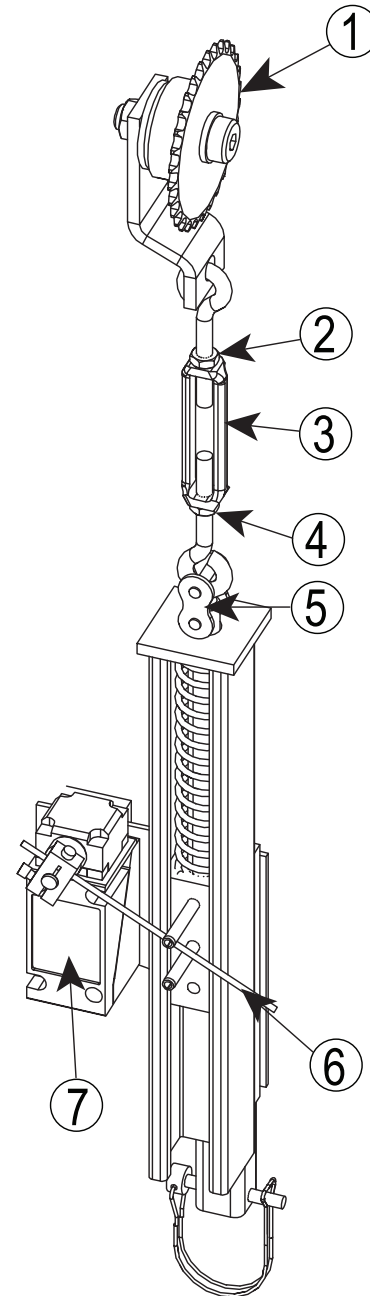
Item	Qty	Part No.	Description
1	1	2693-1000	Chain, #100, SBR
	1	2693-6100	Chain, #100, HSP
	1	4102-1000	Chain, #120, SBR
	1	4102-6100	Chain, #120, HSP
	1	7880-1000	Chain, #140, SBR
	1	7880-6100	Chain, #140, HSP
2	2	2693-1001	Master Link, #100 Chain, SBR
	2	2693-6101	Master Link, #100 Chain, HSP
	2	4102-1001	Master Link, #120 Chain, SBR
	2	4102-6101	Master Link, #120 Chain, HSP
	2	7880-1001	Master Link, #140 Chain, SBR
	2	7880-6101	Master Link, #140 Chain, HSP
3	2	7651-0000	Swivel, Round Eye Double
4	2	7938-1001	Master Link, #35 Chain
5	2	7938-0000	Chain, #35 x Length
6	2	3715-0000	"S" Hook
7	1	6189-0000	Toggle, #100 Chain
	1	6188-0000	Toggle, #120 Chain
	1	7924-0000	Toggle, #140 Chain



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 PFL-20180816-2

**Chain Tensioner Assembly**

Item	Qty	Part No.	Description
	1	10101-0000	Chain Tensioner Assembly with Right-hand Bracket, Single Pole Limit Switch, and Limit Switch Arm
	1	10101-0001	Chain Tensioner Assembly with Left-hand Bracket, Single Pole Limit Switch, and Limit Switch Arm
	1	10107-0035	Chain Tensioner Assembly without Limit Switch
1	1	10244-0035	Sprocket and Bracket Assembly
	1	10244-1000	Sprocket and Bracket Assembly, S/S
2	1	6358-0010	Nut, 5/16-18, RH Thread
3	1	2520-0000	Turnbuckle, Tensioner
4	1	3732-0010	Nut, 5/16-18, LH Thread
5	1	5668-0000	Link, Tensioner
6	1	5959-0007	Arm, Limit Switch, 5" (127mm) Long
7	1	2893-0000	Limit Switch
		2893-0005	Limit Switch, Single Pole
		6269-0000	Limit Switch, Double Pole
		2889-0006	Limit Switch, XPF 4/7
*	1	**	Bolt, Limit Switch Mounting
*	1	**	Lock Washer, Limit Switch Mounting
*	1	**	Washer, Limit Switch Mounting
*	5"	4211-0000	Channel, Unistrut, P3300, 13/16
Unistrut Mounting Hardware:			
*	2	5927-0020	Screw, HHC, 3/8-16x1.25, GR2
*	2	5858-0011	Lock Washer, Std, 3/8
*	2	6296-0011	Washer, Flat, Std, 3/8
*	2	7879-0000	Nut, Twirl, 3/8-16

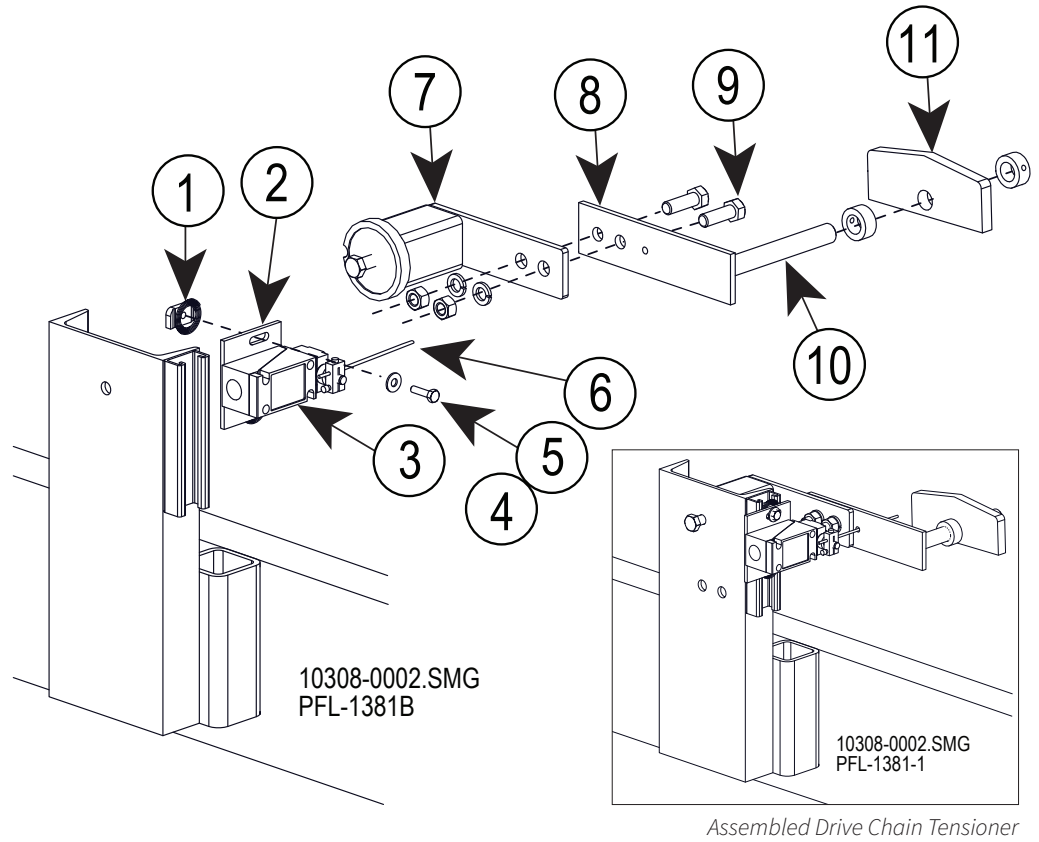


\* Not Shown on Illustration

\*\* Contact PFlow Industries, Inc. Parts Department for part number. VRC serial number required.



**Drive Chain  
 Tension Sensor  
 Assembly  
 (located on the  
 Drive Chain  
 Assembly)**



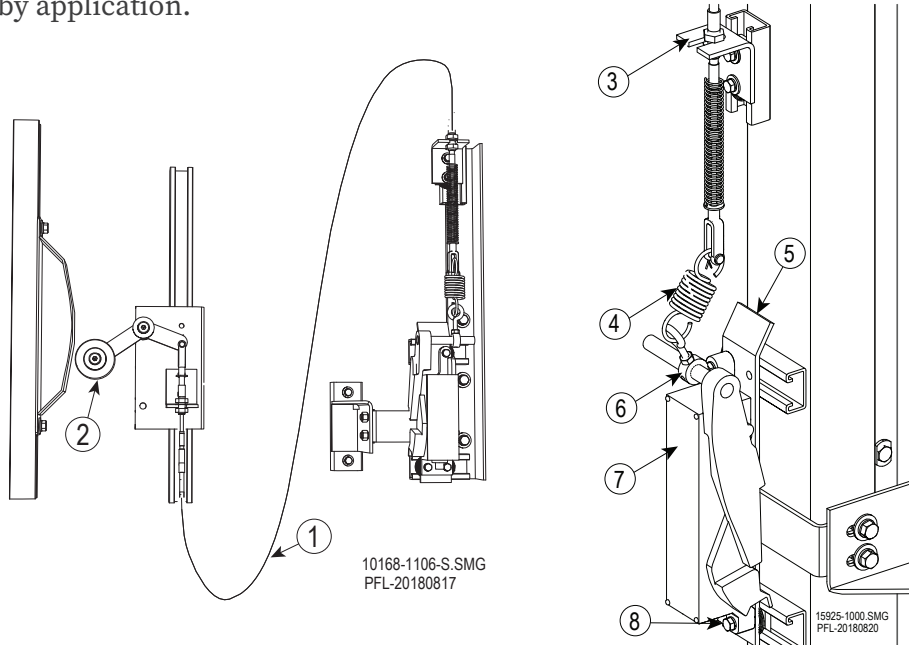
Item	Qty	Part No.	Description
1	2	5834-0000	Nut, Twirl, 1/4-20
2	1	6483-0000	Mounting Plate
3	1	**	Limit Switch
4	2	6029-0016	Screw, HHC 1/4-20 x 1
5	2	6296-0009	Washer, Flat, Std, 1/4
6	1	**	Arm, Adjustable
7	1	5933-0000	Drive Chain Tensioner
8	1	9562-0000	Arm Extension
9	2	6755-0024	Screw, HH 1/2-13 x 1 1/2
	2	5858-0013	Lock Washer, Std, 1/2
	2	6358-0013	Nut, Hex, 1/2-13
10	1	6719-0011	Set Collar 3/4 with Nylock Screw
11	1	7465-0000	Guide, Tension, #100 Drive Chain
	1	6894-0000	Guide, Tension, #120 Drive Chain
	1	J9030-0564	Guide, Tension, #140 Drive Chain
7-11	1	6541-0000	Sensor Assembly, #100 Drive Chain
7-11	1	6541-0001	Sensor Assembly #120 Drive Chain

\*\* Contact PFlow Industries, Inc. Parts Department for part number.  
 VRC serial number is required.



**Interlocks**

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



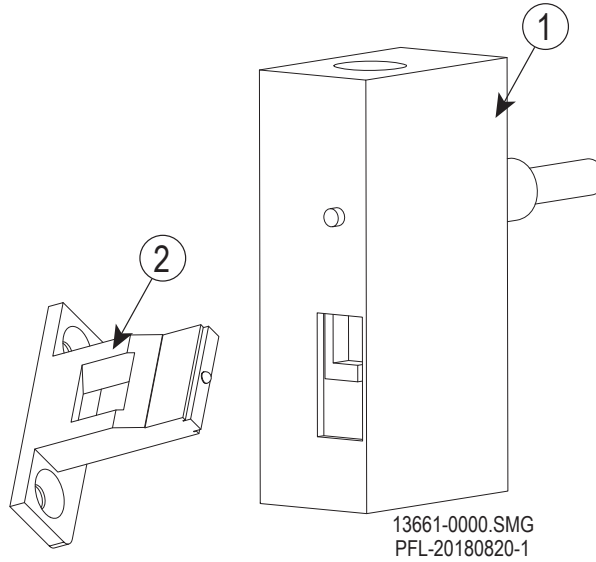
Item	Qty	Part No.	Description
1	1	9292-0120	10' Control Cable Assembly
	1	9292-0180	15' Control Cable Assembly
	1	9292-0300	25' Control Cable Assembly
	1	9292-0360	30' Control Cable Assembly
2	1	9280-0000	Roller Arm Assembly
	1	2618-0000	Wheel only
3	1	10170-0000	Bracket, Mtg, Control Cable
4	1	**	Extension Spring
5	1	10167-0000	Plate, Interlock, Gate V.A.
6	1	9332-0009	Set Collar, Cable Interlock
	1	3694-0000	Eye Bolt, 1/4-20, 1" Long
	1	6358-0009	Hex Nut, 1/4-20, Plated
7	1	2678-0000	Interlock, Anderson, LH
	1	2678-0001	Interlock, Anderson, RH
	1	2678-4000	Interlock, Anderson, LH, Water Resistant
	1	2678-4001	Interlock, Anderson, RH, Water Resistant
	1	2678-0000-QD	Interlock, Anderson, LH, with Quick Disconnect
	1	2678-0001-QD	Interlock, Anderson, RH, with Quick Disconnect
	1	2678-4000-QD	Interlock, Anderson, LH, Water Resistant, with QD
	1	2678-4001-QD	Interlock, Anderson, RH, Water Resistant, with QD
8	1	6029-0020	Screw, HHC, 1/4-20, 1-1/4"
	1	5858-0009	Lock Washer, Std, 1/4
	1	5834-0001	Nut, 1/4-20, with Spring

\*\* Contact PFlow Industries, Inc. Parts Department for part number. VRC serial number is required.



**Interlocks**

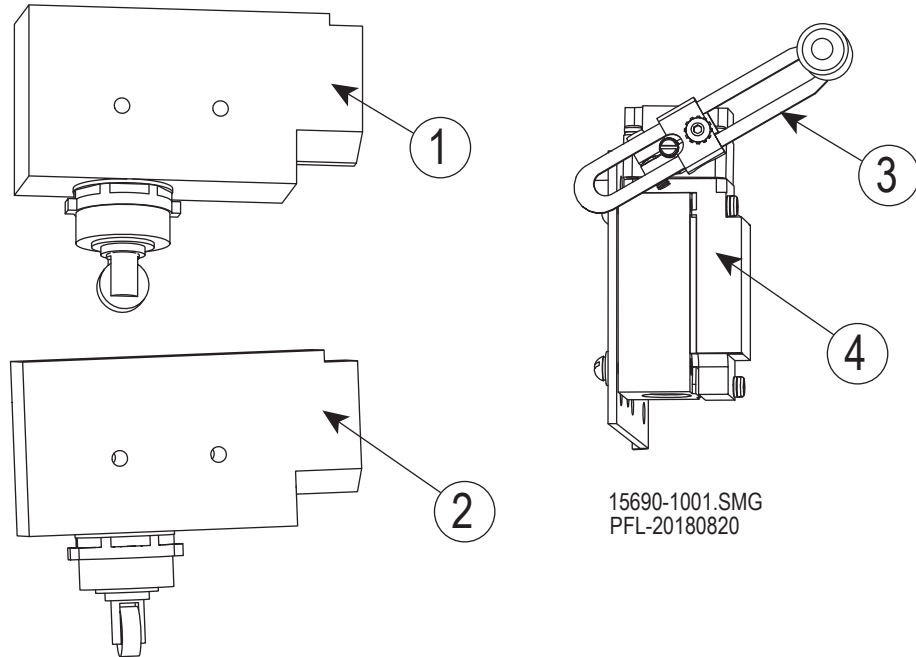
The interlock is a device used to mechanically prevent the gate from opening. Below is the GAL interlock supplied. As a safety device, replacement components are only available as shown below. Some configurations may vary by application.



Item	Qty	Part No.	Description
1	1	13660-0000	Interlock, GAL, RH
	1	13661-0000	Interlock, GAL, LH
2	1	8078-0013	Keeper

**Gate Status  
Switches**

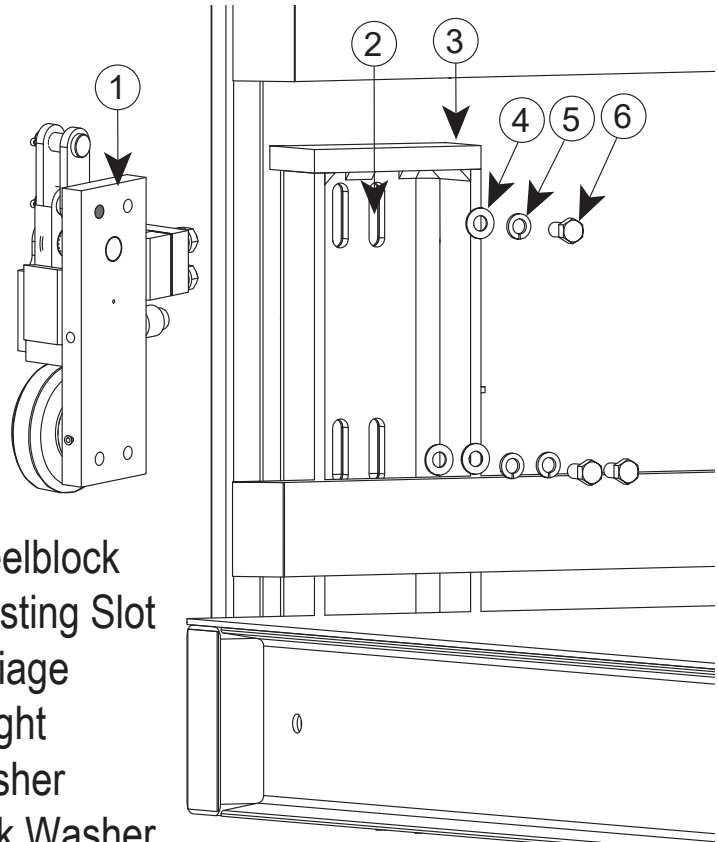
A gate status switch is supplied when the contact are not being used. If required, it will be mounted to the gate post or header. Normally the GAL and Anderson interlocks do not use this switch. Specific order requirements may differ.



Item	Qty	Part No.	Description
1	1	6220-0000	Roller Plunger, Parallel
2	1	6216-0000	Roller Plunger, Perpendicular
3	1	2891-0000	Adjustable Roller Arm
4	1	2893-0000	Switch

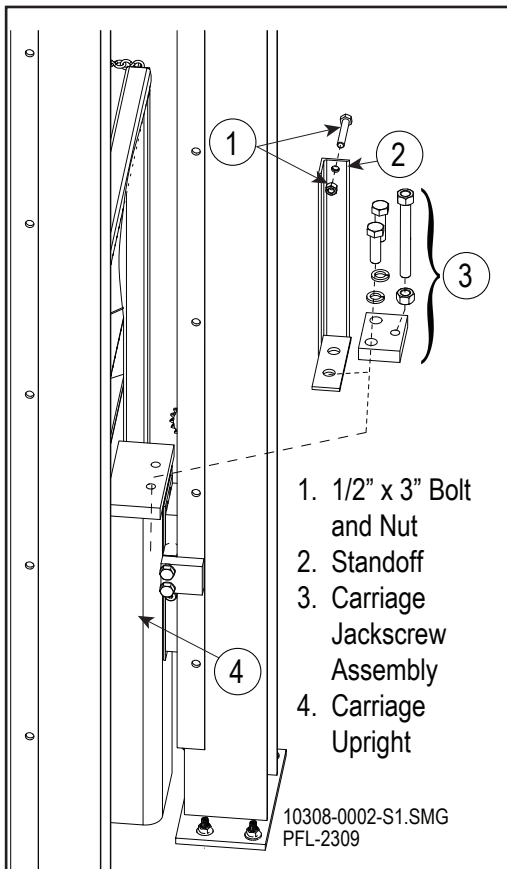


**Wheelblock  
 Attachment**



1. Wheelblock
2. Adjusting Slot
3. Carriage Upright
4. Washer
5. Lock Washer
6. Hex Head Bolt

10308-0002.SMG  
 PFL-180726

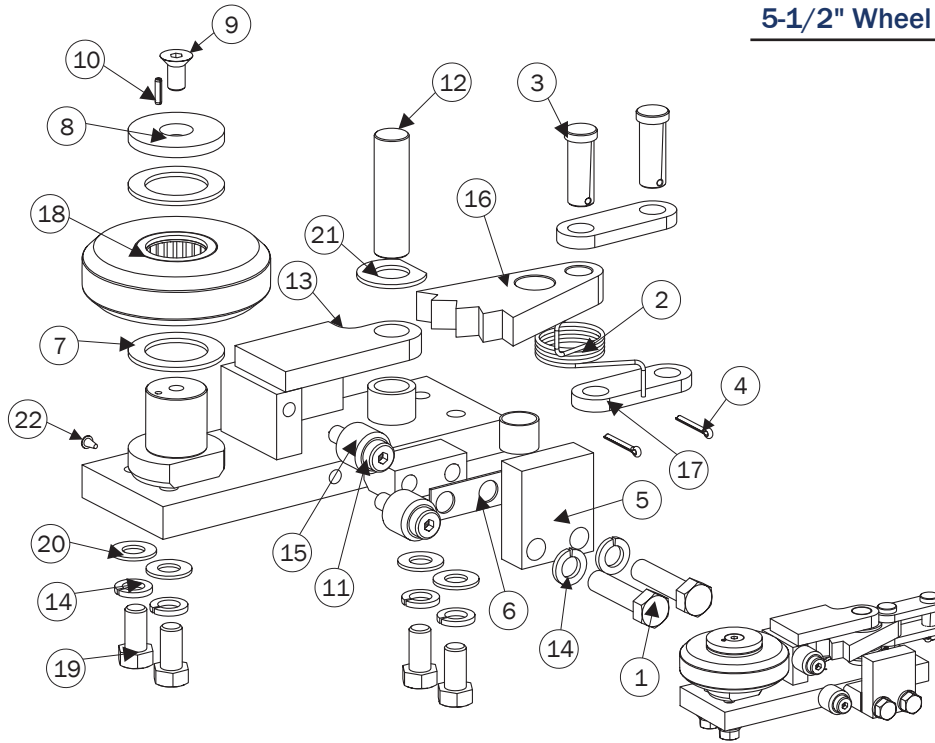


1. 1/2" x 3" Bolt and Nut
2. Standoff
3. Carriage Jackscrew Assembly
4. Carriage Upright

10308-0002-S1.SMG  
 PFL-2309



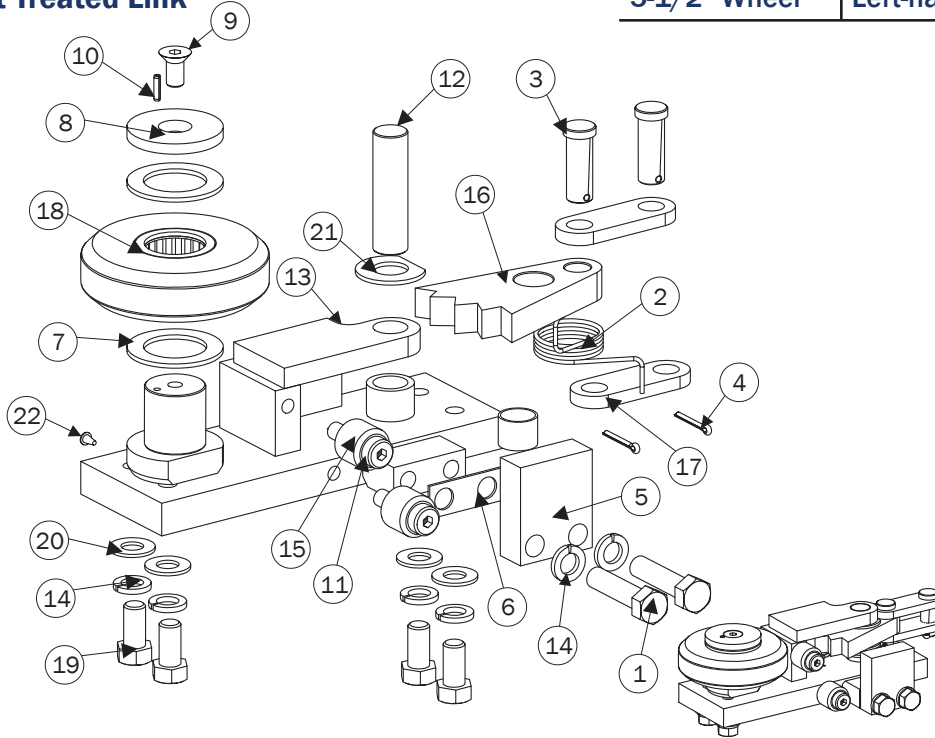
Wheelblock Assembly	Steel Wheel	5-1/2" Wheel	Right-hand	16220-0000
		5-1/2" Wheel	Left-hand	16221-0000



Item	Qty	Part No.	Description
1	2	2198-0040	Screw, HHC, 5/8-11 X 2.25, Gr8
2	1	2443-0000	Spring, Cam, Torsion, RH
	1	2127-0000	Spring, Cam, Torsion, LH
3	2	2521-0000	Pin, Clevis, 3/4 X 2
4	2	2522-0000	Pin, Cotter, 5/32 X 1 1/4
5	1	2754-0000	Shoe, Wheelblock
6	1	2767-0000	Spacer, Whlblk Shoe, .08
7	2	3622-0000	Washer, Thrust, 2-3/4 OD
8	1	3629-0000	Washer, Retainer, Steel
9	1	4299-0016	Screw, FHSC, 1/2-13 x 1
10	1	5209-0012	Pin, Roll, 3/16 x 3/4" LG
11	2	5221-0000	Roller 1.25 OD Guide Plstc

Item	Qty	Part No.	Description
12	1	5230-0000	Pin, Cam, Wheelblock
13	1	5244-0000	Wheel Weldment, RH, RB
	1	5245-0000	Wheel Weldment, LH, RB
14	6	5858-0015	Lock Washer, Std, 5/8
15	2	5874-0020	Bolt, Shoulder, 5/8 X 1 1/4
16	1	6186-0000	Safety Cam Assy
17	2	6187-0000	Link, Safety Cam
18	1	6381-0001	Wheel Assy, Steel, 5 1/4
19	4	7278-0028	Screw, HHC, 5/18-11 x 1.75, GR 5
20	4	6296-0015	Washer, Std, Flat, 5/8
21	1	8339-0000	Bearing, Thrust
22	1	9975-0006	Plug/Cap, Plastic

<b>Wheelblock Assembly with Heat Treated Link</b>	<b>Steel Wheel</b>	<b>5-1/2" Wheel</b>	<b>Right-hand</b>	<b>16220-0010</b>
		<b>5-1/2" Wheel</b>	<b>Left-hand</b>	<b>16221-0010</b>



Item	Qty	Part No.	Description
1	2	2198-0040	Screw, HHC, 5/8-11 X 2.25, Gr8
2	1	2443-0000	Spring, Cam, Torsion, RH
	1	2127-0000	Spring, Cam, Torsion, LH
3	2	2521-0000	Pin, Clevis, 3/4 X 2
4	2	2522-0000	Pin, Cotter, 5/32 X 1 1/4
5	1	2754-0000	Shoe, Wheelblock
6	1	2767-0000	Spacer, Whlblk Shoe, .08
7	2	3622-0000	Washer, Thrust, 2-3/4 OD
8	1	3629-0000	Washer, Retainer, Steel
9	1	4299-0016	Screw, FHSC, 1/2-13 x 1
10	1	5209-0012	Pin, Roll, 3/16 x 3/4" LG
11	2	5221-0000	Roller 1.25 OD Guide Plstc

Item	Qty	Part No.	Description
12	1	5230-0000	Pin, Cam, Wheelblock
13	1	5244-0000	Wheel Weldment, RH, RB
	1	5245-0000	Wheel Weldment, LH, RB
14	6	5858-0015	Lock Washer, Std, 5/8
15	2	5874-0020	Bolt, Shoulder, 5/8 X 1 1/4
16	1	6186-0000	Safety Cam Assy
17	2	6187-0001	Link, Safety Cam
18	1	6381-0001	Wheel Assy, Steel, 5 1/4
19	4	7278-0028	Screw, HHC, 5/18-11 x 1.75, GR 5
20	4	6296-0015	Washer, Std, Flat, 5/8
21	1	8339-0000	Bearing, Thrust
22	1	9975-0006	Plug/Cap, Plastic

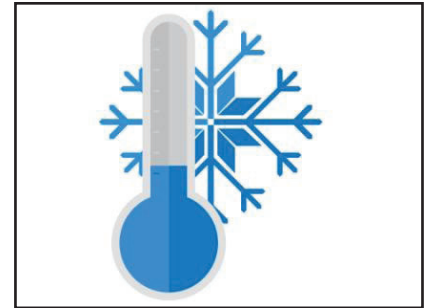


**Environment**

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**

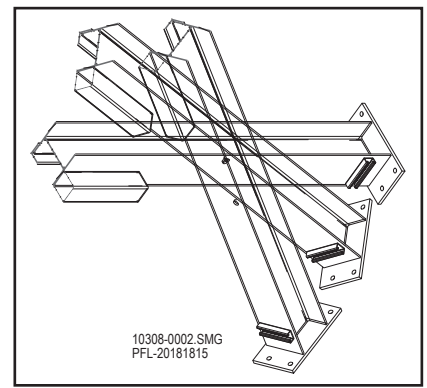
Outdoor storage is **not** recommended. Our warranty policy does not cover damage as a result of improper storage.



Avoid Cold Temperatures Figure 18-1

**Stacking**

Except for placing the parts container (crate) and bracing on the empty carriage, stacking of the various gate components is strictly forbidden. Enclosure and gate panels will warp. Objects stacked on top of the columns, drivebase assembly and/or hydraulic cylinders may cause severe damage. See Figure 18-2.

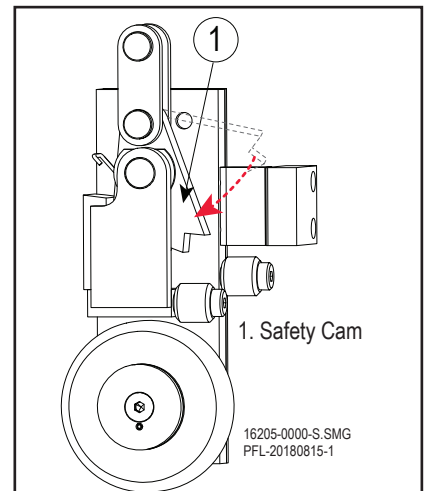


Do Not Stack Components Figure 18-2

**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 **safety cams** on the exposed **wheelblock assemblies** with a non-detergent oil and rotate to make sure the safety cams move freely. See Figure 18-3.
4. Elevate the **drivebase assemblies** 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 and Rotate Safety Cam Figure 18-3

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**

ASME B20.1-2015 defines a qualified person 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.

5. Rotate the drivebase shaft. **Apply power** to the motor/brake with the correct voltage and correct brake wiring configuration with the vent plug installed in the reducer. This will rotate the drive shaft and cycle the brake once. **Manually cycle the brake** several times using the lever on the side of the motor. After rotating with temporary power, remove the vent plug and install the original plug to prevent contamination of the reducer oil. Before initial use, drain and replace the reducer oil.
6. Apply lithium-type grease to the **pillow block and bearings**. Wrap or trap the pillow blocks to avoid exposure to contaminants if needed.
7. 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 18-4.
8. Make sure the **parts crate** remains sealed and dry.



Place Inside Control Enclosure  
Figure 18-4

Storage for Longer  
than Six Months

For units stored longer than six months, it is recommended that you contact the PFlow Industries, Inc. Product 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 container (crate). Do not open the parts container (crate). If the manuals are required, contact the PFlow Industries, Inc. Product Support Department for an electronic copy (.pdf).





**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, and safety warnings are the installer's responsibility. Make sure the warning labels are placed on each gate and each push button station.

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



## Section 19 | Signage Locations



**MATERIAL HANDLING SOLUTIONS**

[www.pflow.com](http://www.pflow.com)  
P 414 352 9000  
F 414 352 9002  
6720 N. Teutonia Ave.  
Milwaukee, WI 53209



**Section 20 | 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 psd@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 areas 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	

## Section 20 | Installation Questionnaire



**MATERIAL HANDLING SOLUTIONS**

[www.pflow.com](http://www.pflow.com)  
P 414 352 9000  
F 414 352 9002  
6720 N. Teutonia Ave.  
Milwaukee, WI 53209



## Section 21 | Acceptance Certification - VRC



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. For the purpose of quality assurance by PFlow Industries, Inc., 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:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other _____
B D DB F M MQ 21 CV											
Job Name:											
Site Street Address:											
Site Mailing Address:											
Site City:						State:			Zip Code:		
Customer Contact Name:						Contact Title:					
Customer Contact Phone: ( ) Ext						E-Mail:					

<b>Tests Performed</b>	Load Capacity:				Start-up Date:
	Load Test:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	at ____ % of lift capacity	Customer Initials:
	Operation Test:	<input type="checkbox"/> Yes	<input type="checkbox"/> No		Comments:
	Gate/Interlock Operation:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> 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. Product Support Department.

**Section 21 | Acceptance  
Certification - VRC**



**MATERIAL HANDLING SOLUTIONS**

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