

Knife Gate

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS



Your Source for Bulk Handling/Air Process Equipment

Wm. W. Meyer & Sons, Inc.

1700 Franklin Blvd • Libertyville, Illinois 60048-4407 • 800-963-4458 • 847-918-0111 • Fax: 847-918-8183
e-mail: sales@wmwmeyer.com · website: <https://www.meyerindustrial.com> or www.wmwmeyer.com

TABLE OF CONTENTS

Safety Precautions	2
Application.....	6
Receiving, Inspection & Storage	7
Installation	8
Start-Up Procedure	9
Service and Maintenance	10
Parts Breakdown.....	11



SECTION I SAFETY PRECAUTIONS

TO THE OWNER, AND INSTALLATION, OPERATION AND MAINTENANCE PERSONNEL

The safety of the operator and those people that may come into contact with the Knife Gate Valve is of great importance to Wm. W. Meyer & Sons, Inc (“Meyer”). The decals, shields, guards and other protective features designed, furnished or recommended for this valve are there for your protection. BEFORE attempting to install, operate or perform maintenance on this Equipment READ carefully and UNDERSTAND all safety instructions contained in this Installation, Operation, and Maintenance Instructions. Failure to do so could result in serious injury or death.

Equipment owner responsibilities

Equipment owners are responsible for understanding the contents of this document and compliance with applicable government laws and regulations and appropriate industry standards. In addition, owners must create a control of hazardous energy procedure for the complete system that incorporates this knife gate and ensure that workers are properly trained to follow it. (See information regarding the vented isolation valve for air operated units on page 5) Appropriate plant safety and equipment training is the responsibility of the plant owner. The installation, operation and maintenance of this equipment should be restricted based on the following:

- Installation and maintenance of equipment must be performed by qualified mechanics/millwrights/maintenance personnel that are familiar with the relevant contents of this manual.
- Installation of any electrical equipment must be completed by qualified electricians, in compliance with applicable codes and ordinances.

Because Meyer is not always aware of the application and does not always have access to the installation, your participation in the safe installation, operation, and maintenance of your Knife Gate Valve (Knife Gate, valve) is critical. The owner/operator is responsible for any hazards related to the material that is being processed through the equipment. If you have any safety or operational questions pertaining to the design or application of the Knife Gate, we encourage you to contact the factory at (800)-963-4458.

Consult the factory for the availability of manuals in other languages.

SIGNAL WORD DEFINITIONS



DANGER

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



WARNING

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



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderated injury.

NOTICE

Indicates information that is important, which if not followed, may cause damage to the equipment.

IMPORTANT SAFETY INFORMATION



WARNING

To reduce the risk of serious injury or death:

- Be qualified.
 - Operation of this equipment must be limited to those that are properly trained in its use.
 - Servicing or maintaining this equipment must be performed by trained maintenance personnel only.
- Read all safety information.
 - Read and understand all the safety related information contained in this manual prior to attempting to perform any work on this equipment.
 - Obey all the safety labels on the equipment. Do not remove any safety labels. If the equipment is missing any labels (see “SAFETY LABELING” section), contact the factory immediately, before putting the equipment into service.
 - For add on equipment; motor, switches, etc. refer to the appropriate manufacturer’s safety information.
- Heavy – handle safely. The weight of this equipment and its component parts could cause serious injury if dropped or mishandled during installation, service, or maintenance. Always use safe handling and rigging methods.
- Guard and avoid dangerous internal parts. The internals of this equipment contains moving part(s) that will crush and cut any body parts they come in contact with, resulting in serious injury or death.
 - Equipment can be actuated remotely, without warning, if energized.
 - Inlet and outlet flanges must always be permanently fastened to mating system components or permanently guarded. Components and guards must be designed such that no access to the interior of the equipment is allowed during operation. See “HAZARD IDENTIFICATION” for process integration and installation details.
 - Never open access covers/door or reach inside the equipment for any reason if the slide plate can move. Lockout/Tagout all sources of energy and secure the slide plate from moving.
- Lockout/Tagout all sources of energy and relieve pressure in accordance with the owner’s/ employer’s procedure for the control of hazardous energy before installing, servicing, or maintaining this equipment. This includes but is not limited to: motors, switches, cylinders, and solenoids. Also consider:

- o Equipment may start remotely, without warning, if energized.
- o Even if all sources of energy are locked out, the air operated units may have residual air pressure in the actuator that must be relieved with further pressurizing blocked with the lockable in-line vented isolation valve.
- o Secure part from moving.
- o If electrical devices are part of the equipment, hazardous voltage exists and presents the risk of electrical shock.
- o Equipment may be under pressure – pressurized gas and material could cause serious injury or death.
- o Equipment surfaces may be hot; allow them to cool before performing any work.
- Always ensure that any electrical devices present are properly grounded in accordance with OSHA, the National Electric Code (NEC), and local codes. Failure to do so could expose personnel to hazardous voltage which could lead to serious injury or death.

HAZARD IDENTIFICATION

Principle of operation

Knife Gates are components which are used in systems to shut off the flow of material between vessels typically for maintenance purposes. By their nature, Knife Gates are of no use by themselves; they derive their utility only when added as a component to a material handling system as part of a larger process.

Amputation hazard

Knife Gates have plates that are driven across openings, usually by powerful actuators. If left unguarded, a moving plate presents a serious personal injury hazard, including but not limited to amputation. Any part of the human body in the way of a plate and the housing will be cut off.

Guarding discharge

Due to the vast number of potential applications in which Knife Gates can be used, it is neither feasible nor practical for Meyer to supply a discharge guard which will be effective in every possible application or process. It is imperative that the Knife Gate should not be operated without the discharge opening fully guarded such that no contact can be made with the moving part(s) inside of the equipment. It is the owner/operator's responsibility to ensure that the Knife Gate is safely integrated for the particular process and application for which it was purchased and that the discharge opening remains guarded at all times during operation.

Guarding inlet

In most applications, the Knife Gate will be integrated into a process, system or application where the inlet opening of the Gate will be guarded by virtue of being attached to another piece of equipment (bin, hopper, etc.) However, there may be instances or situations where the inlet of the Knife Gate becomes accessible (i.e. through a clean out door or access hatch on the attached equipment) to a user. As noted above, due to the vast number of potential applications in which a Knife Gate may be used, it is neither feasible nor practical for Meyer to design or supply an inlet flange guard that will work for a customer's specific application or process. It is the owner/operator's responsibility to ensure that the Knife Gate is safely integrated for the particular process and application for which it was purchased and that the inlet opening remains guarded at all times during operation.

Isolating Energy

Even if all sources of energy are locked out, the air operated units may have residual air pressure in the actuator. This air pressure must be relieved and further pressurizing of the actuator must be blocked in order for the slide gate to be considered at "Zero Energy State" and comply with Lockout/Tagout. The lockable in-line vented isolation valve included with the controls, must be closed and locked for this equipment to be deemed safe to service or maintain. To do this: push the yellow slide up and then secure the slide with the proper Lockout/Tagout device.

Training

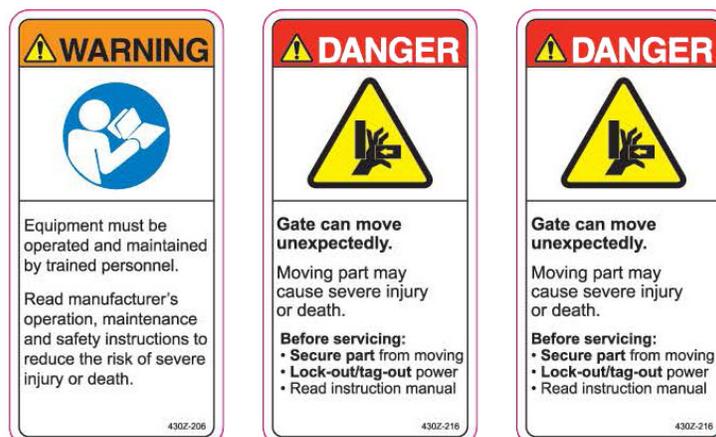
The owner also bears the responsibility to ensure that personnel who may be working around a Knife Gate are properly trained. Personnel must be aware that: (1) anything coming into contact with the moving plate will be cut off/amputated; (2) Knife Gate plates can move without warning; (3) before working on, cleaning, repairing or maintaining a Knife Gate, Lockout/Tagout procedures must be strictly followed; and (4) gates must not be operated without guarding in place. Before working around a Knife Gate, personnel must read the Operator's Manual.

SAFETY LABELING

The safety labels shown are affixed to your Equipment. A Safety Supplement Data sheet is packed with your equipment at the time of shipment. Additional Safety Supplement and labels are available at no additional charge for the system installer's or plant owner's discretionary use/placement to ensure this Equipment is installed, operated and maintained in the safest possible manner.

The following recommendations are offered to assist in the placement of additional safety labels, if needed. The objective is for anyone who approaches the Knife Gate sees the labels alerting him or her how to avoid the hazard.

- Place labels in locations that all personnel operating and maintaining the Knife Gate or any other people that may have access to the equipment will readily see as they are preparing to work on the equipment and/or as they approach it.
- Due to the location of the Knife Gate, labels may have to be located near it, for example; on nearby structural steel or adjacent equipment. This location needs to be the point of access where the label can be easily seen and the hazard is clearly associated with the Knife Gate.



If you have received a unit without labels, the labels fall off, or are damaged, contact Meyer immediately (800-963-4458) to obtain replacements at no charge, prior to installation, use or maintenance.

INFORMATION FOR SAFETY AND SERVICE

A description of every Meyer Knife Gate is kept on file with the factory. These specifications can be referenced by supplying the serial number to your local Meyer Representative. If you have any safety or Equipment-related questions we encourage you to contact the Meyer factory based on the cover contact information.

NOTE: The serial number is located on a metal identification label permanently affixed to every Knife Gate before it leaves the factory. To aid us in providing you with a special service, application assistance and help with spare part requirements, please record the following:

Type/Size _____

Serial Number _____

Date of Installation _____



SECTION II APPLICATION

A Knife Gate is used to shut off the flow of material between vessels typically for maintenance. Sizing of the Knife Gate Actuator depends on whether the gate will need to open or close against a head of material, the bulk density of the material, the differential pressure across the gate, and the head height.

Meyer Knife Gates are available with manual operators or air cylinders. The manually operated gates have limited differential pressure, bulk density, and head requirements when compared to the air actuated models.

The air cylinder models are available with optional limit switches to indicate when the Knife Gate is open and closed. The switches may be added to an air operated gate in the field.

Temperature

Standard Knife Gates can operate up to 190°F. As an option, they can be built for 450°F service with the addition of high temperature parts.

Pressure

An O-ring is substituted for one row of packing in pressure applications 10 psig and above.

Materials of Construction

Knife Gates are available in Cast Iron/Mild Steel construction.

Accessories

Air Operated Knife Gates require regulated, clean, dry, lubricated air for operation. An air set including a filter, regulator, and lubricator is normally provided for this purpose. A solenoid valve is used to open and close the Knife Gate by controlling the air to the cylinder. The solenoid valve may be of various NEMA ratings and air return, spring return, or dual coil (fail last state) depending on the particular requirements of the application.



SECTION III RECEIVING, INSPECTION & STORAGE

A. RECEIVING AND INSPECTION

Upon receipt of equipment and material from Wm. W. Meyer & Sons, Inc., the following basic steps should be taken. The equipment is heavy and proper handling procedures should be used (See the "Heavy – handle safely" information in the "IMPORTANT SAFETY INFORMATION" section):

1. Use the packing list to determine that all the items shipped have been received. Your equipment was carefully crated for safe shipment when given to the carrier. If items are missing, contact Wm. W. Meyer & Sons, Inc., per the contact information at the end of this section.
2. Check for damage. Damage in transit is the responsibility of the carrier. Title to your equipment and all other items in the shipment were transferred to you as soon as the shipment left our dock, thus it is your responsibility to handle any claim. In the event damage has occurred:
 - a. Be sure to have the driver sign a copy of the freight bill with a notation about any damage and contact their office before the driver leaves your premises.
 - b. Contact the carrier to arrange for an independent inspector to come out to inspect the damage and to prepare the inspection report. It is imperative that this inspection is done before you start to unpack or use any of the equipment.
 - c. If there are any visible problems with your unit or any other items in the shipment, you or the driver must note in detail the damage on all copies of the freight bill before signing for the shipment. Then immediately call Wm. W. Meyer & Sons, Inc.
 - d. Photographic records of the damage are helpful to communicate the extent and type of damage as well as provide a clear record.
 - e. In addition to inspecting damaged equipment you should also check the condition of the safety labels to ensure they have not been damaged or come off. If they have, contact the factory for replacements prior to installation.
 - f. Concealed Damage: If Equipment or goods are discovered to be damaged in shipment at a later date, contact the carrier and Wm. W. Meyer & Sons, Inc., immediately.
 - g. In all cases of damage in transit, contact Wm. W. Meyer & Sons, Inc., for assistance in determining whether or not this damage may, in any way, affect safety or proper operation. Please contact us so that we can assist you with replacement parts or with any questions about the claim process, using the following contact information:

Wm. W. Meyer & Sons, Inc.
1700 Franklin Blvd.
Libertyville, IL 60048

800-963-4458 or 847-918-0111
sales@wmwmeyer.com

B. STORAGE

1. If moved to storage, the equipment should be located in a dry area, preferably inside. Outside storage will require adequate protection from the weather.
2. The inlet and outlet of this equipment should be securely covered to protect the interior while in storage. For prolonged storage, an anti-rust compound should be applied to all interior surfaces. See actuator and electrical components' data for storage recommendations for these items.
3. After prolonged storage and prior to start-up, the Knife Gate and its actuator should be inspected by qualified personnel. Contact Wm. W. Meyer & Sons, Inc. if any assistance is required.
4. Long Term Storage procedures are available by contacting the factory.



SECTION IV INSTALLATION

See the "HAZARD IDENTIFICATION" section before proceeding.

⚠ DANGER The internals of this equipment has parts that can crush and cut. Before installing the equipment follow the Lockout/Tagout information in the "IMPORTANT SAFETY INFORMATION" section. Failure to do so will lead to serious injury or death if a body part contacts a moving internal part. In addition the equipment and parts are heavy, see "Heavy – handle safely" information in the "IMPORTANT SAFETY INFORMATION" section.

1. We recommend that inlet and outlet flanges remain covered until the gate is ready to be attached to the mating equipment.
2. This equipment must be installed with the inlet and outlet flanges parallel to the mating system flanges. This equipment is not designed to serve as a structural support for companion system components. It must be adequately supported to prevent distortion.
3. Be sure the gate is mounted with the slide plate is on top of the guides.
4. The gate must be installed so that there is access to the inspection covers.
5. The mating flange above the gate must be the same size or smaller as the inlet flange. If larger, material can quickly wear it out.
6. The air filter (air actuated models) must be mounted vertically so that it can be drained of moisture when necessary. It also must be installed ahead of the regulator and lubricator.
7. The air supply to the regulator (air actuated models) should be a minimum of 80 psig and a maximum of 120 psig. Maximum pressure on components is 150 psig.
8. Ensure that the inlet and outlet flanges are permanently fastened to mating components or are permanently guarded.
9. Verify that the openings are properly guarded and that the labels will be visible.

If electrical connections are made as part of the installation, they must be done by a qualified electrician, in accordance with applicable codes and ordinances.

10. If a solenoid valve is part of the installation it will need to be wired to the electrical control source: SPST switch, pushbutton, PLC, etc. Limit switches, if supplied, will need to be wired to some sort of electrical indicator such as a light or PLC. Always refer to the manufacturer's instructions or wiring schematics.



SECTION V START-UP PROCEDURE

⚠ WARNING Prior to use, the operator must read and understand all the safety related information including all warnings and guarding instructions. Verify that all guarding is in place and area is clear of all non-essential personnel. Failure to do so could lead to serious injury or death.

A. Initial Start-Up

1. The general appearance of the Knife Gate and surrounding area should be visually inspected to determine if it can be operated safely and without causing any type of damage.
2. If the gate is air actuated open the air supply valve and set the regulator to 80 psig.
3. Actuate the gate, noting any unusual noise or vibration. Use the manual override on the solenoid to test the movement of the gate. If noise is evident, shut down the unit and after following Lockout/Tagout procedures, inspect the gate for any foreign materials that may be interfering with the proper operation. If no obstruction is found, contact Meyer before further operation.
4. On air actuated models adjust the flow controls to control the speed of the gate at this time. Knife Gate Speed Adjustment Procedure

The speed at which the Knife Gate opens and closes is controlled by the flow control valve mounted on the solenoid.

- Opening the valve, knob is turned counter-clockwise, allows more air to flow out of the cylinder and increases the speed at which the gate moves.
 - Turning the knob clockwise restricts the air flow and slows the gate down.
 - Cycle the gate open and closed with the solenoid valve to determine the speed of the gate.
 - Adjust the flow control until the gate closes as rapidly as possible while landing softly. It will take some fine tuning of the valve to get the desired result.
5. When shutting down the Knife Gate, shut off air and electricity according to plant operating procedures.

B. Required Operating Conditions

Closing

1. The Knife Gate is designed to close through a flow of material. However, it depends on the material being handled. If the material is larger than 50 mesh then the material flow must be cleared before closing the gate. In addition, no differential pressure can be present; the air mover must be shut down or isolated before closing.

2. The gate can now be closed using the appropriate controls.

Opening

1. If a pressure differential is present then the air mover must be shut down or isolated before opening the Knife Gate.
2. The gate can now be opened using the appropriate controls.

C. Periodic Checks

Check the Knife Gate during each shift for the next couple of days after start up. Observe the equipment for any unusual vibration, heat, or noise. Check the fasteners for tightness and the flanges for leaks. Any utility service piping and associated valves and gauges should also be checked. Make sure all accessories are operating properly.



SECTION VI SERVICE AND MAINTENANCE

⚠ DANGER Before servicing and maintenance follow the Lockout/Tagout information in the “IMPORTANT SAFETY INFORMATION” section and follow the owner’s/employer’s procedure for the control of hazardous energy. Failure to do so will lead to serious injury or death.

Lubrication

The solenoid and air cylinder require lubrication which is supplied by a lubricator. If an air set is supplied with the Knife Gate this will be the first in-line component. An adjustment dial on the lubricator controls the flow of lubricant to the downstream components and must be kept filled with adequate lubricant.

The sleeve bearings require no maintenance.

Condensation

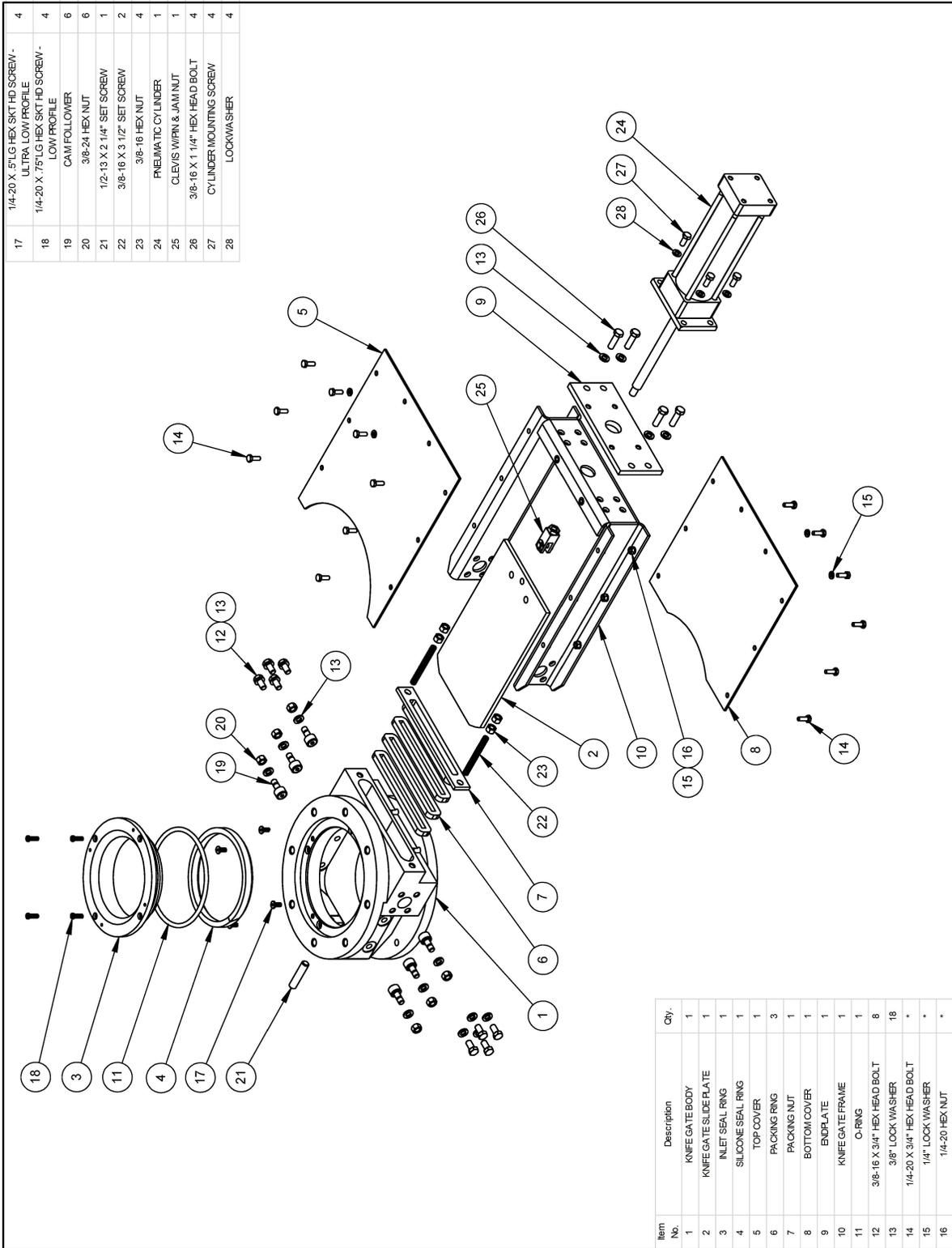
The air supplied to power the air actuated Knife Gates needs to be clean dry air. Compressed air systems need to have a dryer to control the moisture content in the air supply. An air filter is part of the air set to protect the solenoid and actuator from water contamination. The discharge of water from this device should be monitored to ensure proper operation. The discharge of water can be controlled with the adjustment knob at the bottom of the air filter bowl. Water can be manually discharged from this bowl if necessary.

⚠ WARNING Before removing the Knife Gate from service, all sources of energy must be locked out according to the owner’s/employer’s Lockout/Tagout procedures. In addition, removing the Knife Gate from service will expose the internals of equipment immediately above and below the gate. This equipment must also be locked out based on the aforementioned procedures. Failure to do so could expose personnel to hazardous moving parts and lead to serious injury or death.

Adjusting the sealing ability of the Knife Gate must be done with the unit removed from service as access to the seal retainer is necessary. The Knife Gate must be in the closed position before any adjustments can be made.



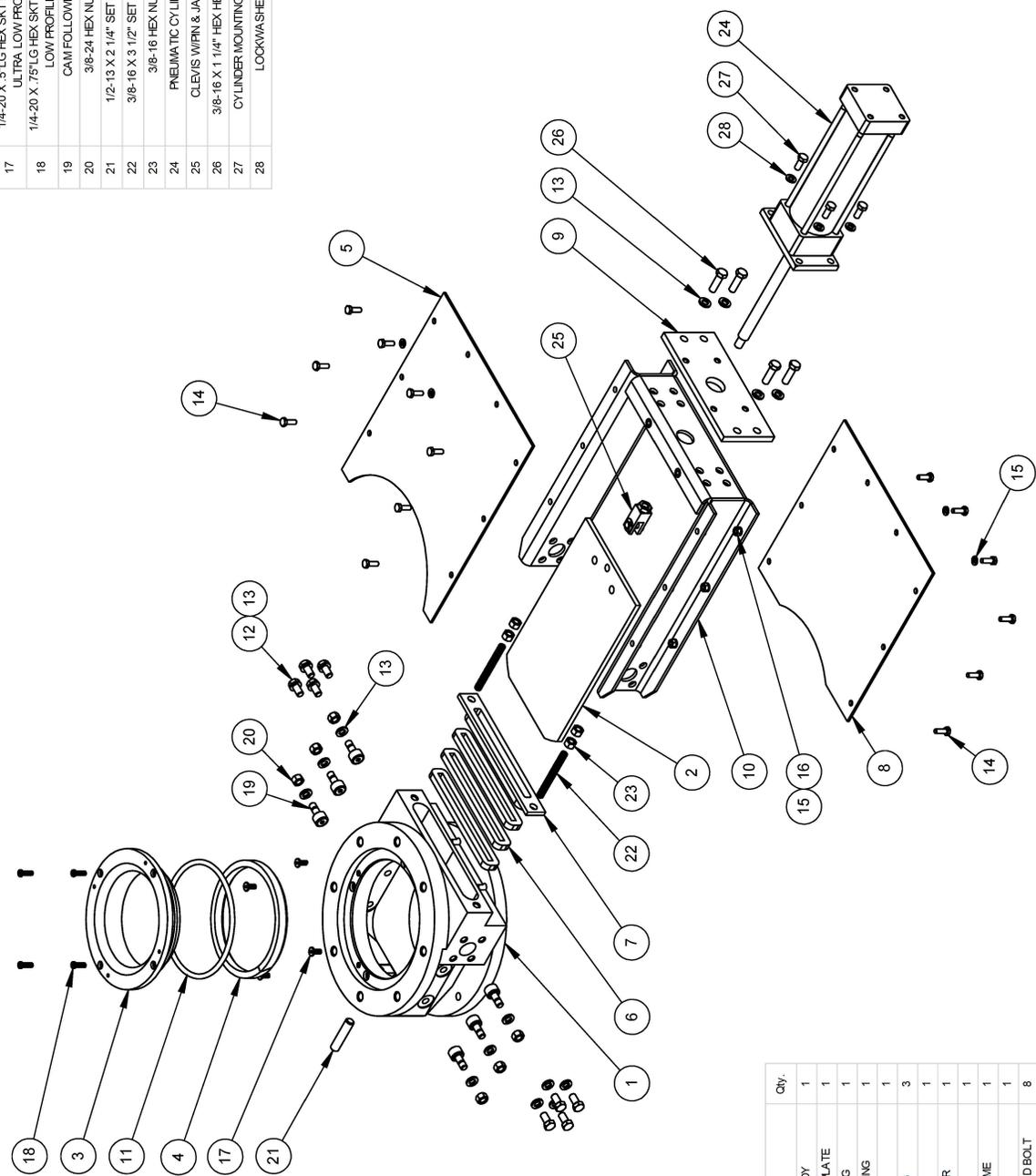
SECTION VII PARTS BREAKDOWN



17	1/4-20 X .5" LG HEX SKT HD SCREW -	4
18	ULTRA LOW PROFILE 1/4-20 X .75" LG HEX SKT HD SCREW -	4
19	LOW PROFILE CAM FOLLOWER	6
20	3/8-24 HEX NUT	6
21	1/2-13 X 2 1/4" SET SCREW	1
22	3/8-16 X 3 1/2" SET SCREW	2
23	3/8-16 HEX NUT	4
24	PNEUMATIC CYLINDER	1
25	CLEVIS W/ PIN & JAM NUT	1
26	3/8-16 X 1 1/4" HEX HEAD BOLT	4
27	CYLINDER MOUNTING SCREW	4
28	LOCKWASHER	4

Item No.	Description	Qty.
1	KNIFE GATE BODY	1
2	KNIFE GATE SLIDE PLATE	1
3	INLET SEAL RING	1
4	SILICONE SEAL RING	1
5	TOP COVER	1
6	PACKING RING	3
7	PACKING NUT	1
8	BOTTOM COVER	1
9	ENDPLATE	1
10	KNIFE GATE FRAME	1
11	O-RING	1
12	3/8-16 X 3/4" HEX HEAD BOLT	8
13	3/8" LOCK WASHER	18
14	1/4-20 X 3/4" HEX HEAD BOLT	*
15	1/4" LOCK WASHER	*
16	1/4-20 HEX NUT	*

17	1/4-20 X .5" LG HEX SKT HD SCREW -	4
18	ULTRA LOW PROFILE	
18	1/4-20 X .75" LG HEX SKT HD SCREW -	4
19	LOW PROFILE	
19	CAM FOLLOWER	6
20	3/8-24 HEX NUT	6
21	1/2-13 X 2 1/4" SET SCREW	1
22	3/8-16 X 3 1/2" SET SCREW	2
23	3/8-16 HEX NUT	4
24	PNEUMATIC CYLINDER	1
25	CLEVIS W/ PIN & JAW NUT	1
26	3/8-16 X 1 1/4" HEX HEAD BOLT	4
27	CYLINDER MOUNTING SCREW	4
28	LOCKWASHER	4



Item No.	Description	Qty.
1	KNIFE GATE BODY	1
2	KNIFE GATE SLIDE PLATE	1
3	INLET SEAL RING	1
4	SILICONE SEAL RING	1
5	TOP COVER	1
6	PACKING RING	3
7	PACKING NUT	1
8	BOTTOM COVER	1
9	ENGR PLATE	1
10	KNIFE GATE FRAME	1
11	O-RING	1
12	3/8-16 X 3/4" HEX HEAD BOLT	8
13	3/8" LOCK WASHER	18
14	1/4-20 X 3/4" HEX HEAD BOLT	*
15	1/4" LOCK WASHER	*
16	1/4-20 HEX NUT	*



SAFETY SUPPLEMENT

ATTENTION INSTALLERS/OPERATORS FOR YOUR PROTECTION:

1. Read and understand the Operating Manual accompanying this equipment before performing any work.
2. Additional safety label kits available from Meyer upon request at no charge. This is part of our effort to ensure this equipment is installed, operated and maintained in the safest possible manner. Affix these labels in locations to achieve maximum visibility and thereby alert any personnel that may be on-site that a potential for injury could occur.
3. Under no circumstances should this equipment be installed or operated in a manner that permits access to the interior of the valve.
4. Inlet and Outlet Flanges must always be permanently fastened to mating system components.
5. In the event that the inlet or outlet is ever exposed, proper guarding to prevent access to the valve interior must be installed immediately and prior to start-up.
6. ***Always follow LOCKOUT-TAGOUT procedure*** before performing any work.
7. Always keep loose clothing, hands, feet or any parts of your body, tools and/or any foreign objects away from all moving equipment and away from any potential pinch point.
8. Never remove any access doors (inspection port covers) above, below, or on the valve itself without first locking out power.
9. Consult your plant safety director, system designer, installation manager or the Meyer factory if you have any questions regarding the proper installation, operation and maintenance of this equipment.

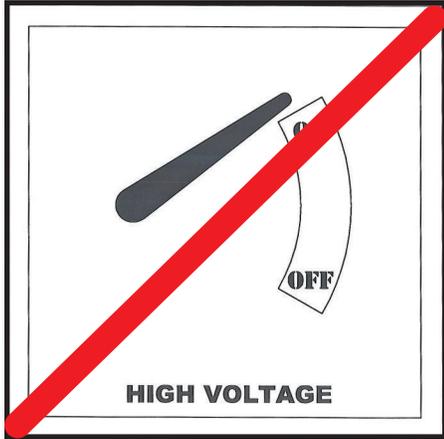
Wm. W. Meyer & Sons, Inc.

1700 Franklin Blvd • Libertyville, IL 60048 • Phone: 847-918-0111 • Fax: 847-918-8183

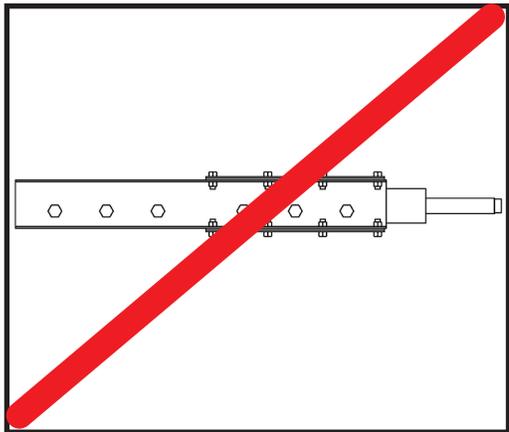
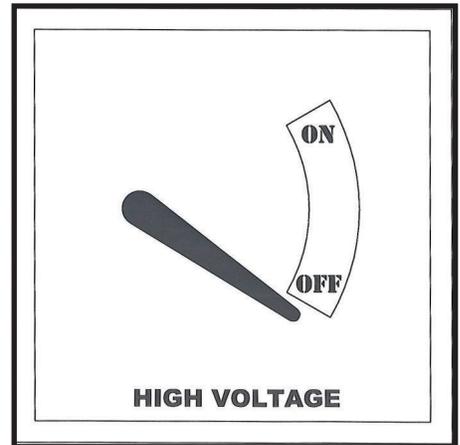
Website: <http://www.meyerindustrial.com>

File # 296-E-002

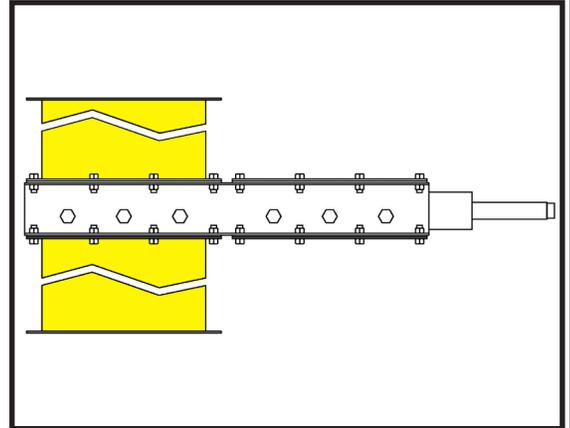
GATE SAFETY PRECAUTIONS



ALWAYS SECURE PART FROM MOVING WHEN WORKING ON THE VALVE. FOLLOW **LOCKOUT-TAGOUT** PROCEDURE.



NEVER OPERATE VALVE WITH EXPOSED INLET / OUTLET FLANGES



SAFETY LABELS

Locate all of the safety labels on your equipment and know their meaning before operating your Slide Gate.



Wm. W. Meyer & Sons, Inc.

1700 Franklin Blvd • Libertyville, IL 60048 • Phone: 847-918-0111 • Fax: 847-918-8183

Website: <http://www.meyerindustrial.com>

File # 296-E-002