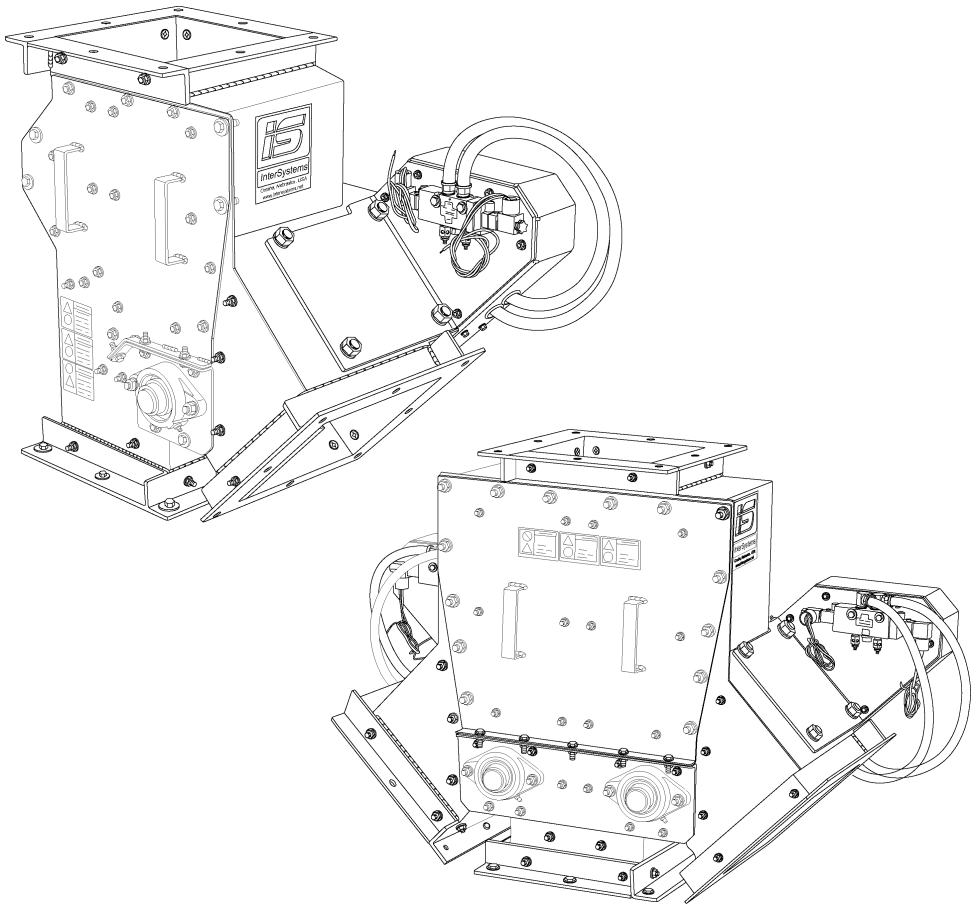


CE Compliant 2-Way and 3-Way Valve

Owner’s Manual - Original Instructions

PNEG-2102CE

Version: 1.0

Date: 05-20-20

PNEG-2102CE

GSI GROUP

CE Declaration of Incorporation
MACHINERY DIRECTIVE 2006/42/EC

GSI Intersystems

9575 N 109th Ave Omaha, NE 68142 Hungary, USA

The GSI Group declares that the machine, parts or equipment

2-WAY AND 3-WAY GRAIN VALVE

Model: **All**

Meet the Essential Requirements of the **ATEX Directive 2014/34/EU** and **Machinery Directive 2006/42/EC**

- Combustible material Grain Dust
- Minimum ignition temperature180°C (maximum design surface temperature 50°C)
- Ex II2D/-; Ex h IIIB/- T50°C Db

In accordance with the following standards:

IEC 60079-0:2017	Explosive atmospheres - Part 0: Equipment - General requirements
EN ISO 80079-36:2016	Explosive atmospheres. Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements
EN ISO 80079-37:2016	Explosive atmospheres. Part 37: Non-electrical equipment for explosive atmospheres - non-electrical type of protection constructional safety “C”, control of ignition sources “B”, liquid immersion “K”
PD CLC/TR 60079-32-1:2018	Explosive atmospheres. Part 32-1: Electrostatic hazards, guidance
EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN4414:2010	Pneumatic fluid power - General rules and safety requirements for systems and their components
EN60204-1:2018	Safety of machinery - Electrical equipment of machines

1. All installation shall be in accordance with manual PNEG-2102CE.
2. ATEX compliance relates soley to the potentially explosive environment which may exist inside the 2-way and 3-way valve.
3. This equipmnt shall not be installed in a potentially explosive environment.

Signed: F. G. Ward

Digitally signed by Frank Ward
DN: cn=Frank Ward, o=GSI EAME Kft, ou=GSI, email=fward@gsiag.com, c=GB
Date: 2020.08.18 15:13:59 +01'00'

Name:

Date:

Contents

All information, illustrations, photos and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

General Information

InterSystems reserves the right to improve its product whenever possible and practical to do so. We reserve the right to change, improve and modify products at any time without obligation to make changes, improvements and modifications on equipment sold previously.

This manual covers the installation and operation for the 2-Way and 3-Way Valve Assembly. This manual provides guidelines for installing the product. You must retain a qualified contractor to provide on-site expertise. InterSystems is not responsible for the installation of this product.

General Safety Statements

1. The valve assemblies are designed and manufactured with operator safety in mind. However, residual hazards remain due to the nature of material handling, and specific material hazards. Use extreme caution at all times.
2. Modifications to equipment may cause extremely dangerous situations that could result in damage to the equipment as well as serious injury or death. Never modify the equipment.
3. InterSystems recommends that you contact the local power company to have a representative survey the installation to ensure wiring is compatible with their system and adequate power is supplied to the unit.

Receiving Inspection

1. Carefully inspect the shipment for damage as soon as it is received. Verify that the quantity of parts or packages actually received corresponds to the quantity shown on the packing slip. One or more cartons containing the fasteners required for assembly are included with the shipment. Report any damage or shortage to the delivering carrier as soon as possible.
2. InterSystems responsibility for damage to the equipment ended with acceptance by the delivering carrier. Refer to the bill of lading for more detailed information.
3. Save all paperwork and documentation furnished with any of the valve assembly components.

Pre-Installation Preparation

1. The MOST IMPORTANT preparations are retaining a licensed engineer to plan the installation and a qualified millwright or contractor to install the valve assembly and the accompanying equipment and structures. Before starting the valve assembly installation, review this manual, the drawing(s) furnished with the equipment and other applicable documents, including but not limited to, O.S.H.A. Regulations and the National Electrical Code and all other applicable federal, state and local codes and regulations.
2. InterSystems does not assume responsibility for the installation.
3. The installation recommendations contained within this manual are for consideration only. The user or installer will want to consult a civil or structural engineer regarding the design, construction and supervision of the entire installation.

Safety Guidelines

Safety guidelines are general-to-specific safety rules that must be followed at all times. This manual is written to help you understand safe operating procedures and problems that can be encountered by the operator and other personnel when using this equipment. Read and save these instructions.

As owner or operator, you are responsible for understanding the requirements, hazards, and precautions that exist and to inform others as required. Unqualified persons must stay out of the work area at all times.

Alterations must not be made to the equipment. Alterations can produce dangerous situations resulting in SERIOUS INJURY or DEATH.

This equipment must be installed in accordance with the current installation codes and applicable regulations, which must be carefully followed in all cases. Authorities having jurisdiction must be consulted before installations are made.

When necessary, you must consider the installation location relative to electrical, fuel and water utilities.

Personnel operating or working around equipment must read this manual. This manual must be delivered with equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

ST-0001-4

Cautionary Symbols Definitions

Cautionary symbols appear in this manual and on product decals. The symbols alert the user of potential safety hazards, prohibited activities and mandatory actions. To help you recognize this information, we use the symbols that are defined below.

DANGER This symbol indicates an imminently hazardous situation which, if not avoided, **will result in serious injury or death.**

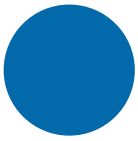
WARNING This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**

CAUTION This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**

NOTICE This symbol is used to address practices not related to personal injury.

This symbol indicates a general hazard.

This symbol indicates a prohibited activity.



This symbol indicates a mandatory action.

ST-0005-2

Safety Cautions

Use Personal Protective Equipment

- Use appropriate personal protective equipment:

Eye Protection

Respiratory Protection

Foot Protection

Hearing Protection

Head Protection

Fall Protection

Hand Protection

- Wear clothing appropriate to the job.
- Remove all jewelry.
- Tie long hair up and back.

ST-0004-1

Follow Safety Instructions

- Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.
- Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.
- If you do not understand any part of this manual or need assistance, contact your dealer.

ST-0002-1

Install and Operate Electrical Equipment Properly

- Electrical controls must be installed by a qualified electrician and must meet the standards set by applicable local codes (National Electrical Code for the US, Canadian Electric Code, or EN60204 along with applicable European Directives for Europe).
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.
- Make sure all equipment is properly grounded.

ST-0027-4

Maintain Equipment and Work Area

- Understand service procedures before doing work. Keep area clean and dry.
- Never service equipment while it is operating. Keep hands, feet, and clothing away from moving parts.
- Keep your equipment in proper working condition. Replace worn or broken parts immediately.

ST-0003-1

Toxic Fume and Dust Hazard

- Do all work outside or in a well-ventilated area. Dispose of paint and solvent properly.
- Remove paint before welding or heating:
  - — Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.
  - — If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
  - — If you use solvent or paint-stripper, remove stripper with soap and water before welding.
  - — Remove solvent or stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

ST-0043-2

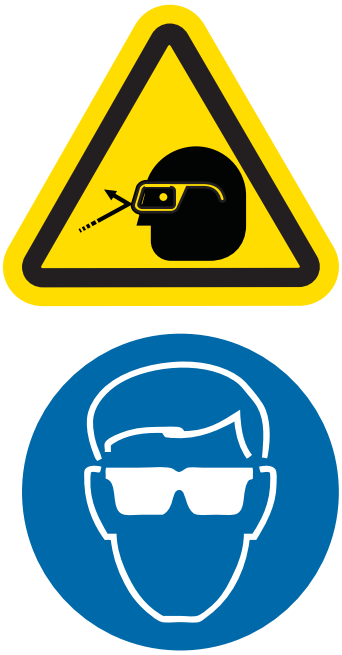
Stay Clear of Moving Parts

- Stay clear — machine can start without warning.
- Entanglement in gate will cause serious injury.
- Keep all shields and covers in place at all times.
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.

ST-0070-1

Flying Material and High Pressure Air Hazard

- Flying material and/or high pressure air can cause severe eye injury or blindness.
- Wear safety glasses around operating equipment.



ST-0071-1

ATEX Compliance

1. The valves are NOT designed for use within a location designated as potentially explosive (ATEX/HAZLOC).
2. ATEX compliance relates solely to the dust and air mix which may occur inside the valve.
3. The valves have been assessed in accordance with EN ISO 80079-36 and EN ISO 80079-37.
4. The equipment category for the valves, in accordance with EN60079-0, is category III and equipment protection level (EPL) is Db.
5. Whilst the likelihood of ignition of a dust air mixture inside the valve, resulting from an ignition source originating in the valve, is extremely low, this can only be maintained through correct installation and maintenance. In particular:
    a. Installation in such a way that the valve is free from mechanical stresses and strains which could cause distortion or damage to the valve and hence interference between the flop and the valve body.
    b. An undisturbed electrical path to earth from any point on the valve to allow the dissipation of any static electrical charge which might occur inside the valve. The maximum resistance for this earth path (for static electricity) shall not exceed 1 Mega Ohm, either at installation or at any time in the life of the valve. Testing should be carried out following installation or relocation of the valve to ensure that this requirement has been met. **NOTE:** *This level of electrical bonding to earth does not fulfil the requirements for electrical safety in relation to standards such as EN60204. The requirements of this standard and/or other standards or electrical safety regulations must also be met in full.* However, electrical safety earth bonding may be used to fulfil the requirements for dissipation of static electricity.
    c. The valve shall be installed free from and/or isolated from any form of mechanical vibration. Attention should be paid to the risk of vibration being transmitted through connected equipment from items such as conveyors, augers, elevators, sorters, cleaners and graders.
    d. Attention shall be paid to routine maintenance, in particular ensuring lubrication and checking of moving parts, bearings, motor, gearbox and/or pneumatic actuator.
    e. Modification or alteration of the valve or its performance characteristics is prohibited.
    f. Repairs and replacements shall be made only using genuine GSI/Intersystems components.
6. Maintenance of the EPL is the operator's responsibility.
7. *See Page 24* gives a list of all the ignition hazards identified and outlines operator requirements relating to the maintenance of the EPL.

Correct Use

1. 2-Way and 3-Way valves are designed to be used as part of a handling system for granular agricultural products only, such as seeds, grain, pulses and granular fertilisers. They shall not be used to handle slurries, liquids, powders, highly flammable, volatile or explosive materials.
2. They shall only be used when incorporated into a stationary/fixed system of grain handling equipment and in such a way that the requirements of all relevant EU Directives and Regulations are met by the system as a whole and on each incorporated component.
3. The installation shall ensure that the inlet and outlet(s) of the valve is enclosed such that the moving parts cannot be reached by upper and lower limbs, as defined in EN ISO 13857.
4. Attention is drawn to the limitations of installation in relation to the ATEX compliance of the valves, stated above.
5. Do not modify the valve in any way.
6. Ensure the power supply to the valve (electrical and/or pneumatic) meets the requirements stated on the valve rating plate.

Safety During Maintenance and Servicing

1.  Before starting any maintenance on the valve, ensure the power supply (electrical/pneumatic) is locked out and tagged so that it cannot be reconnected by anyone but you.
2. Pay particular attention to pneumatic power, as pressure may remain stored in the pipework or fittings, and could result in unexpected operation of the valve even when locked out. Check for stored pressure by shutting of the pneumatic supply then cycling the valves, before locking out the electrical power.
3. When dealing with a stuck or blocked valve, beware of the risk of stored energy in the moving parts of the valve (flop). If unsure check the valve movement with a tool so that sudden movement cannot result in injury.
4. Ensure all guards and covers are replaced before re-starting the valve.

Safety Sign-Off Sheet

Below is a sign-off sheet that can be used to verify that all personnel have read and understood the safety instructions. This sign-off sheet is provided for your convenience and personal record keeping.

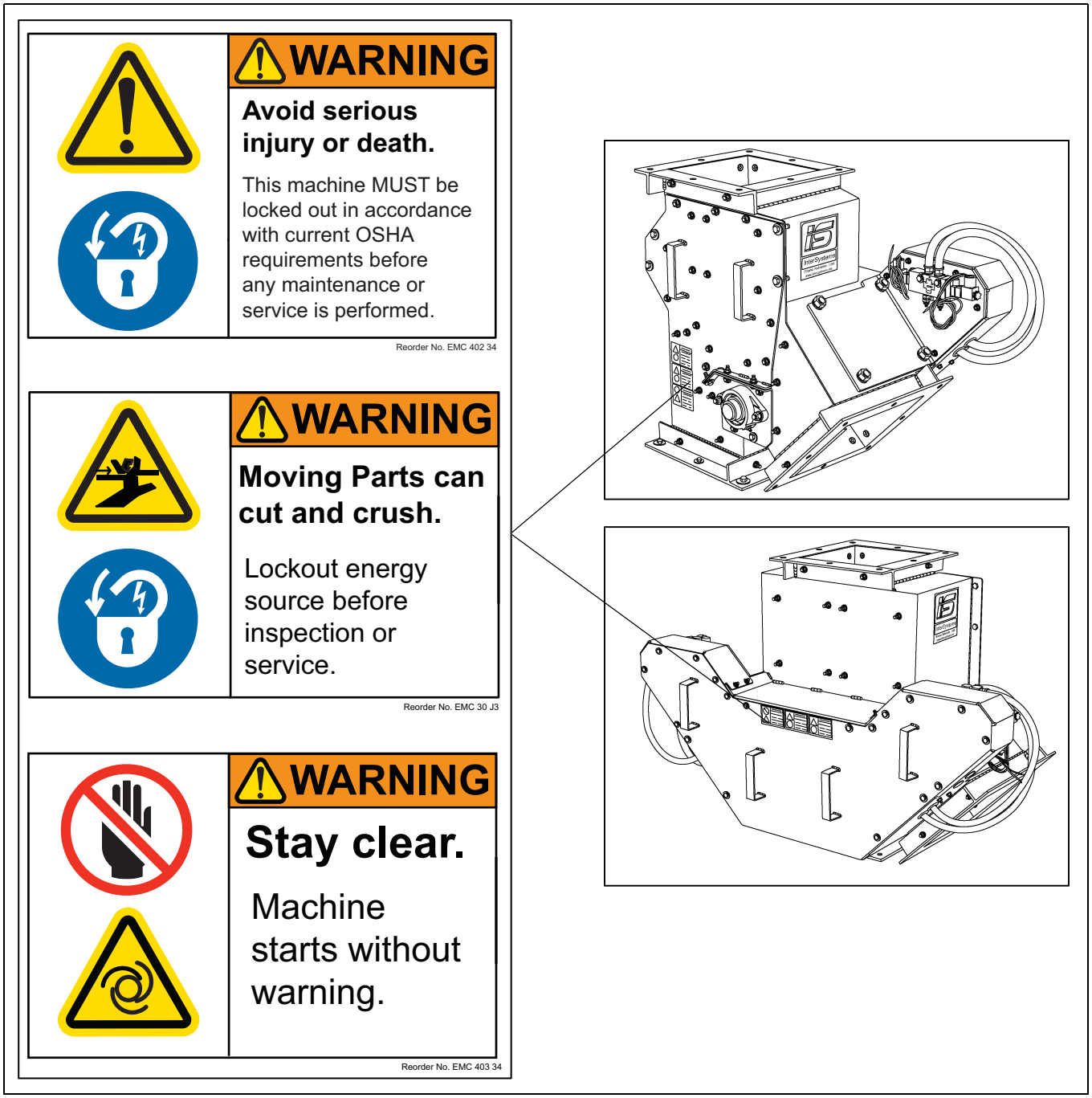
Date	*Employee Name*	*Supervisor Name*

ST-0007

Safety decals are the safety indicators which must be carefully read and understood by all personnel involved in the installation, operation, service and maintenance of the Valve Assembly. These decals must never be removed, tampered with, painted over or obscured in any way.

NOTE:

1. *The decals shown below are not shown in actual size.*
2. *Keep decals wiped clean at all times.*
3. *Decals must be replaced if they are destroyed, missing or no longer be read.*



CE ATEX Rating Plate

The rating plate must be fixed to the valve and remain legible at all times. If the plate becomes damaged or illegible, please request a free replacement from Intersystems or your dealer, quoting your model and serial numbers

GSI Intersystems			
9575 N 109th Ave Omaha, NE 68142			
USA			
2 WAY VALVE			
	MODEL	1234567	
	SERIAL NUMBER	abcdefg	
	MOTOR POWER	0.38	kW
	MOTOR VOLTAGE	400	V
	PHASE	3	
		50	hz
	FLA	0.73	A
WARNING - DO NOT INSTALL IN AN EXPLOSIVE ATMOSPHERE			
CE			
Ex	II2D/-; Ex h IIIB/- T50°C Db		

Figure 3A *Rating Plate for Electric 2-Way and 3-Way Valve*

GSI Intersystems			
9575 N 109th Ave Omaha, NE 68142			
USA			
2 WAY VALVE			
	MODEL	1234567	
	SERIAL NUMBER	abcdefg	
	PNEUMATIC PRESSURE	2069	mBar
	PNEUMATIC FLOW	34	m3/h
	SOLENOID VALVE VOLTAGE	230	V
		50	hz
WARNING - DO NOT INSTALL IN AN EXPLOSIVE ATMOSPHERE			
CE			
Ex	II2D/-; Ex h IIIB/- T50°C Db		

Figure 3B *Rating Plate for Pneumatic 2-Way and 3-Way Valve*

Installation Procedure

The InterSystems factory assembled 2-Way and 3-Way Valve can be shipped directly on a conventional truck trailer.

1. The top of this assembly should be horizontal in both directions.

   NOTE: *Make sure the correct orientation of the housing section.*

2. Align the connecting holes so that bolts and nuts can be loosely inserted at this time.

   NOTE: *Use stainless steel bolts and nuts.*

3. With all holes aligned, tighten with adequate torque to prevent loosening.

Lifting Safety

Care shall be taken when lifting the 2-way and 3-way valve into position.

1. Check the weight of the valve from your order documents.
2. Select lifting method and accessories that can adequately support the weight.
3. Use lifting straps, wrapped safely and securely around or through the valve body or using lifting accessories fixed securely by the top flange bolt holes. (Minimum 4 holes).
4. Check the orientation of the valve before lifting so that it can be presented correctly to it's installation position.

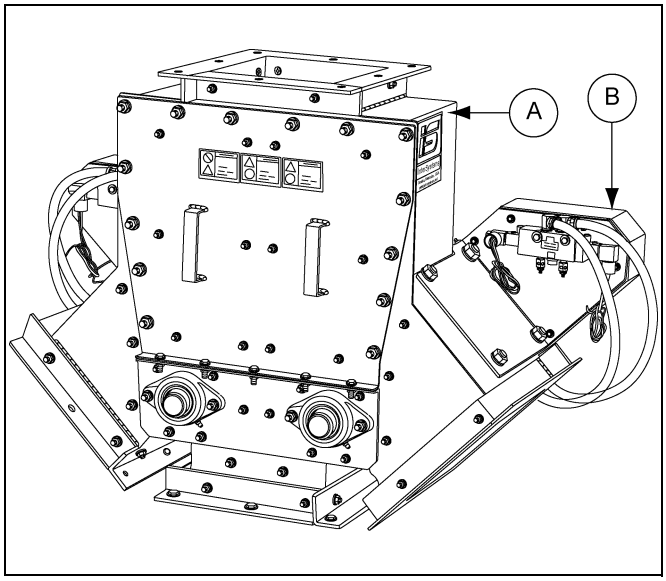


Figure 4A *3-Way Valve*

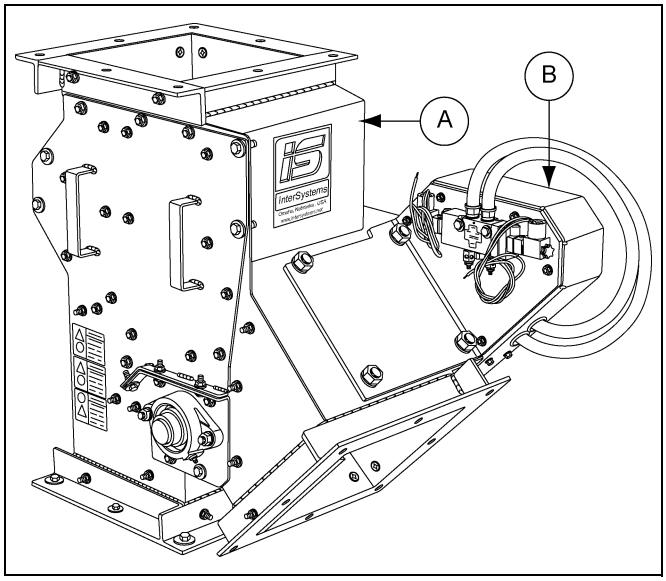


Figure 4B *2-Way Valve*

Ref #	Description
A	Valve Housing Assembly
B	Control System

Electrical Safety

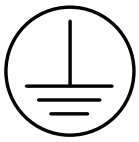
Equipment shall include:

1. Fuse protected main power supply.
    a. The electrical supply should include earth leakage protection, eg residual current device (RCD) or residual current circuit breaker (RCCB), to provide automatic disconnection in the event of a fault.
2. Lockable main safety disconnect.

    a. Disconnects all electrical power.
3. Lockable motor service disconnect.

    a. Adjacent to each motor (or group of motors).
    b. Disconnects all power to the motors.
4. Emergency stops.

    a. Stops all equipment <u>immediately</u> when pressed.
    b. Must remain engaged until manually disengaged.
    c. Equipment <u>shall not</u> immediately re-start when the emergency stop is re-set.
5. The electrical supply must include a properly designed protective earth system (PE), with connection to all exposed conductive parts.



6. All motors shall be connected to protective earth at the terminal provided.
7. The control system shall include.
    a. Short circuit protection.

Equipment <u>shall not</u> immediately re-start following re-establishment of power.

Motor circuits shall include over current protection set according to the full load current, stated on the motor rating plate.

Motor thermal protection may also be required.

All electrical design, installation and testing must be carried out by a qualified electrical engineer, in accordance with EU Directives and Standards, local laws and codes.

Pneumatic Safety

Pneumatic connection to the valves (if required) shall comprise:

1. Regulated and filtered compressed air supply, including suitable over pressure protection, in accordance with the requirements stated on the product rating plate (maximum pressure/maximum flow rate).
2. Manual, lockable shut off valve to enable the valve to be isolated from the pneumatic supply.

   NOTE: *Electrical isolation of the compressor alone does not fulfil this requirement*.
3. All components shall be CE marked and selected for the maximum pressure rating of the system.
4. Rigid pipes shall be used wherever possible. Where flexible pipes/hoses must be used, these should be kept to the minimum possible length. All pipes and hoses shall be adequately fixed to prevent damage and ‘whip’ in the event of breakage.
5. The system shall be designed and tested in accordance with EN4414.

When locating the valve assembly, ensure there is adequate room for cylinder movement and that the cylinder hoses are not vulnerable to trapping or damage.

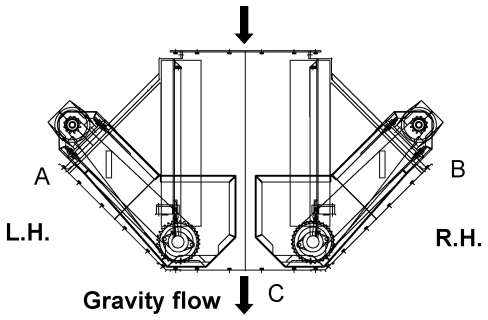
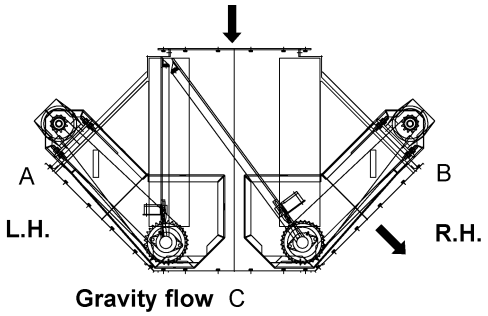
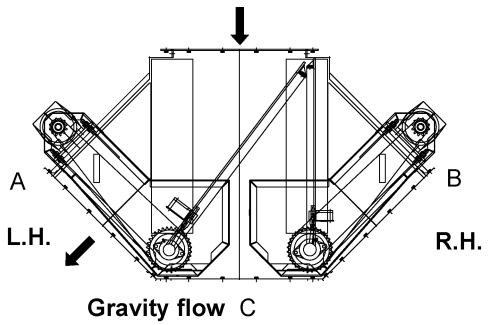
3-Way Valves

The 3-Way valves can be either electric or pneumatic used in InterSystems.

1. Electric 3-Way Valve
2. Pneumatic 3-Way Valve

Electrically Operated 3-Way Valve

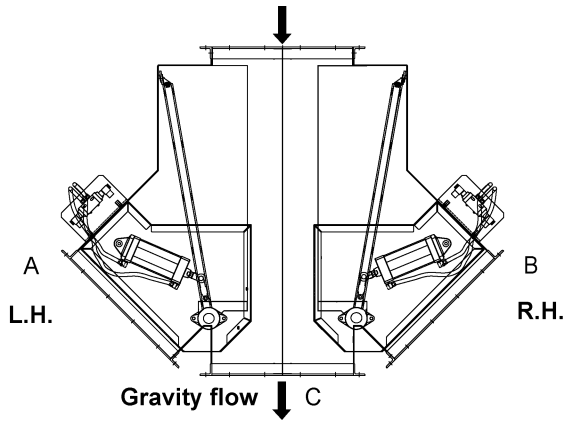
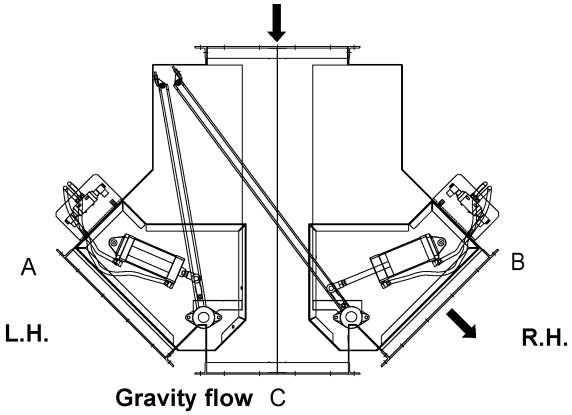
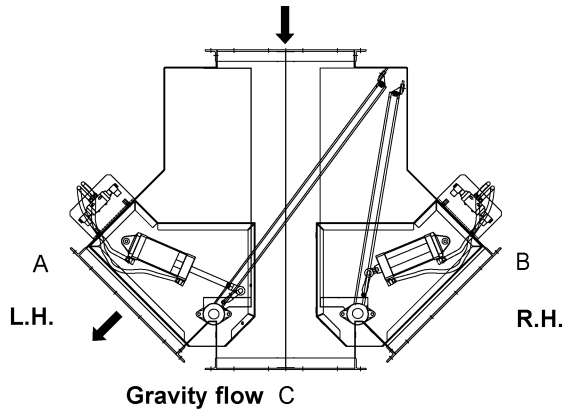
Electric 3-Way Valve is controlled by a motor operated assembly unit. This 3-Way Valve is configured with one (1) inlet port and three (3) outlet ports which bypasses the material. There are two (2) diverter blades present in 3-Way Valve assembly connected with a chain sprocket unit, which in turn controlled by two (2) electric motor assembly. The flow of material through the ports are directed according to the position of the diverter blade. The diverter blade can set based on the condition whether the material should pass through R.H. outlet, L.H. outlet or gravity flow. The operational sequences of an electrically operated 3-Way Valve is shown *below*.

Diverter Blade Position	Description	Condition
	When the diverter blade positions are idle.	The material flows through port “C”.
	The R.H diverter blade must be rotated to left to close port “A”.	The material flows through port “B”.
	The L.H diverter blade must be rotated to right to close port “B”.	The material flows through port “A”.

NOTE: *Do not run the motor in the wrong direction. It may cause damage to the valve.*

Pneumatically Operated 3-Way Valve

Pneumatic 3-Way Valve is controlled by two (2) double acting single cylinder assembly unit. This 3-Way Valve is configured with one (1) inlet port and three (3) outlet ports which bypasses the material. The valve system is equipped with two (2) double acting single cylinders connected to a drive arm, which controls the movement of the diverter blade. The flow of material through the ports are directed according to the position of the diverter blade. The diverter blade can set based on the condition whether the material should pass through R.H. outlet, L.H. outlet or gravity flow. The operational sequences of pneumatically operated 3-Way Valve is shown *below*.

Diverter Blade Position	Description	Condition
	When the diverter blade positions are idle.	The material flows through port “C”.
	The R.H diverter blade must be rotated to left to close port “A”.	The material flows through port “B”.
	The L.H diverter blade must be rotated to right to close port “B”.	The material flows through port “A”.

NOTE: *Front and rear ports of a cylinder may both be vented, but both will not be pressurized. Pressurization of both the port of a cylinder results in an unknown condition.*

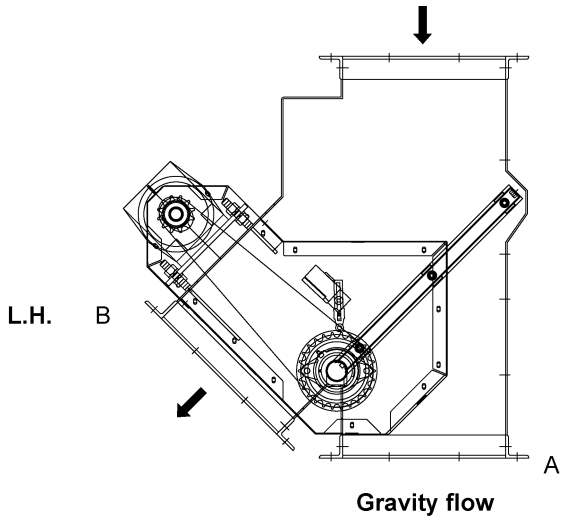
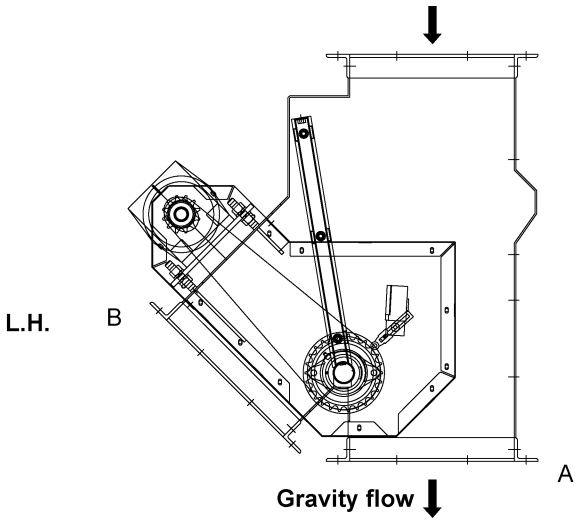
2-Way Valves

There are two (2) types of 2-Way Valves used in InterSystems:

1. K-Valve - Electric and Pneumatic
2. Y-Valve - Electric and Pneumatic

Electrically Operated K-Valve

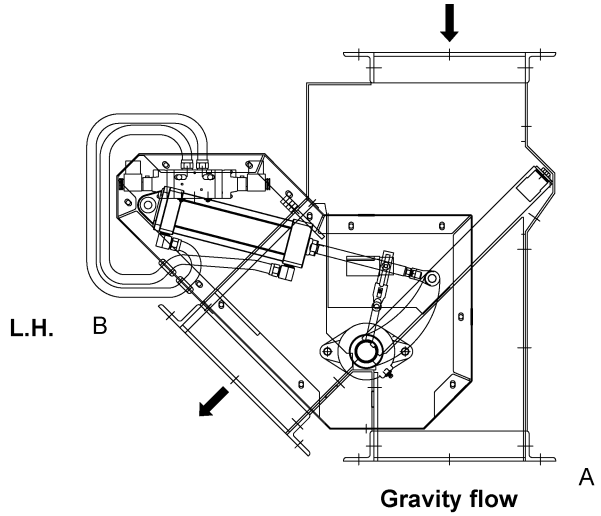
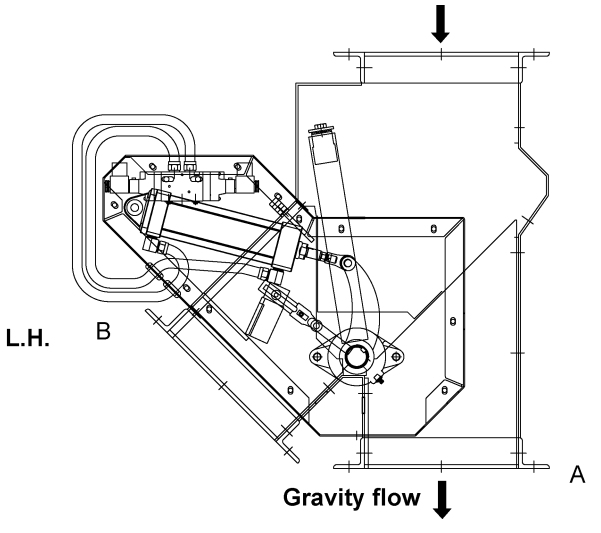
Electric K-Valve is controlled by a motor operated assembly unit. K-Valve is configured with one (1) inlet port and two (2) outlet ports which bypasses the material. A diverter is present in K-Valve, connected with a chain sprocket unit, which in turn controlled by an electric motor assembly. The flow of material through the ports are directed according to the position of the diverter blade. The diverter blade can set based on the condition whether the material should pass through L.H. outlet or gravity flow. The operational sequences of an electrically operated K-Valve is shown *below*.

Diverter Blade Position	Description	Condition
	The diverter blade must be rotated to right to close port “A”.	The material flows through port “B”.
	The diverter blade must be rotated to left to close port “B”.	The material flows through port “A”.

NOTE: *Do not run the motor in the wrong direction. It may cause damage to the valve.*

Pneumatically Operated K-Valve

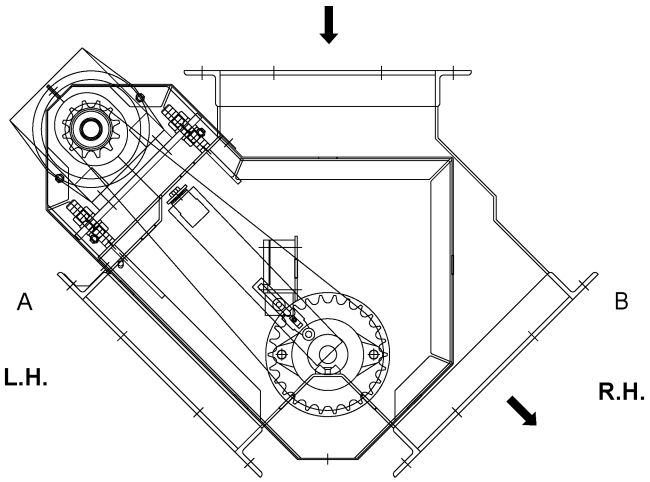
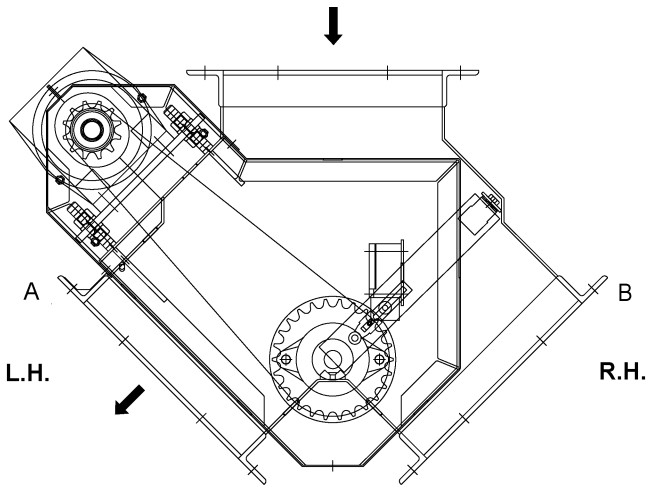
Pneumatic K-Valve is controlled by a double acting single cylinder assembly unit. K-Valve is configured with one (1) inlet port and two (2) outlet ports which bypasses the material. A diverter blade is present in K-Valve, connected with a drive arm, which in turn controlled by the cylinder assembly. The flow of material through the ports are directed according to the position of the diverter blade. The diverter blade can set based on the condition whether the material should pass through L.H. outlet or gravity flow. The operational sequences of pneumatically operated K-Valve is shown *below*.

Diverter Blade Position	Description	Condition
	The diverter blade must be rotated to right to close port “A”.	The material flows through port “B”.
	The diverter blade must be rotated to left to close port “B”.	The material flows through port “A”.

NOTE: *Front and rear ports of a cylinder may both be vented, but both will not be pressurized. Pressurization of both the port of a cylinder results in an unknown condition.*

Electrically Operated Y-Valve

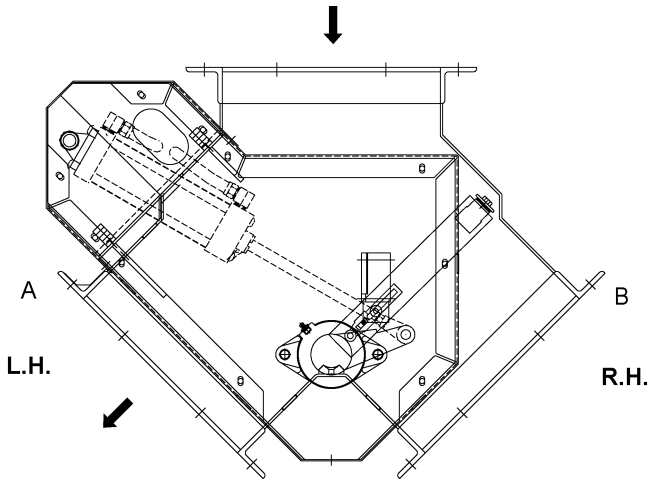
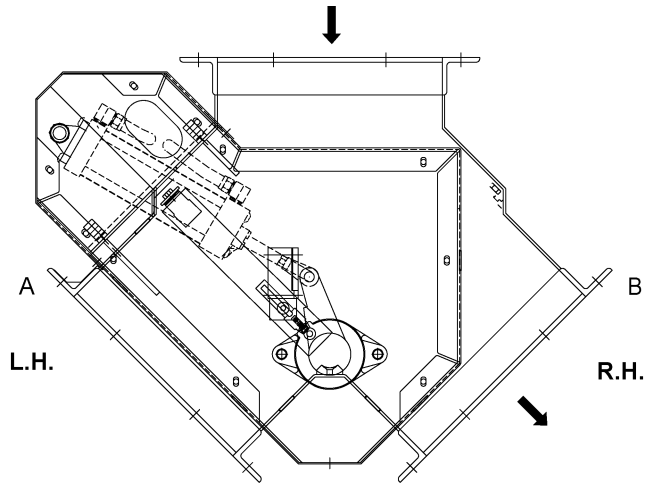
Electric Y-Valve is controlled by a motor operated assembly unit. Y-Valve is configured with one (1) inlet port and two (2) outlet ports which bypasses the material. A diverter blade is present in Y-Valve, connected with a chain sprocket unit, which in turn controlled by an electric motor assembly. The flow of material through the ports are directed according to the position of the diverter blade. The diverter blade can set based on the condition whether the material should pass through R.H. outlet or L.H. outlet. The operational sequences of an electrically operated Y-Valve is shown *below*.

Diverter Blade Position	Description	Condition
	The diverter blade must be rotated to left to close port “A”.	The material flows through port “B”.
	The diverter blade must be rotated to right to close port “B”.	The material flows through port “A”.

NOTE: *Do not run the motor in the wrong direction. It may cause damage to the valve.*

Pneumatically Operated Y-Valve

Pneumatic Y-Valve is controlled by a double acting single cylinder assembly unit. The Y-Valve is configured with one (1) inlet port and two (2) outlet ports which bypasses the material. A diverter blade is present in Y-Valve, connected with a drive arm, which in turn controlled by the cylinder assembly. The flow of material through the ports are directed according to the position of the diverter blade. The diverter blade can set based on the condition whether the material should pass through R.H. outlet or L.H. outlet. The operational sequences of pneumatically operated Y-Valve is shown *below*.

Diverter Blade Position	Description	Condition
	The diverter blade must be rotated to right to close port “B”.	The material flows through port “A”.
	The diverter blade must be rotated to left to close port “A”.	The material flows through port “B”.

NOTE: *Front and rear ports of a cylinder may both be vented, but both will not be pressurized. Pressurization of both the port of a cylinder results in an unknown condition.*

Ignition Hazard Assessment

Possible Ignition Sources	Equipment Related (Yes/No)	Reason	Limits
Hot Surfaces	Yes	Sliding friction on ‘flop’ and/or valve side during flop movement.	Lowest likely ignition temperature is 180°C (blue grass seed), therefore maximum operating temperature should be limited to 120°C.
Mechanical Sparks	Yes	Sparks created due to impact flop against the inside of the valve.	1 m/s
Flames, Hot Gases	No	No flames or hot gases are anticipated in use the 2-way and 3-way valves.	
Electric Sparks	No	None of the electrical items (limit switches for motors) are located inside the valve or in direct contact potentially explosive atmosphere.	
Stray Electric Current and Cathodic Corrosion Protection	No	None of the electrical items (limit switches for motors) are located inside the valve or in direct contact potentially explosive atmosphere.	Earth continuity testing to EN60204. Continuity for electrical safety (<<10 ohm).
Static Electricity	Yes	MWPE flop ‘wiper’ UHMW liners Grain static charge	Earth leakage resistance < 1M ohm.
Lightning	Yes	Possible on outdoor installations.	
Electromagnetic Waves	No	None present	
Ionising Radiation	No	None present	
High Frequency Radiation	No	None present	
Ultrasonics	No	None present	
Adiabatic Compression	No	None present	
Chemical Reaction	No	None present	

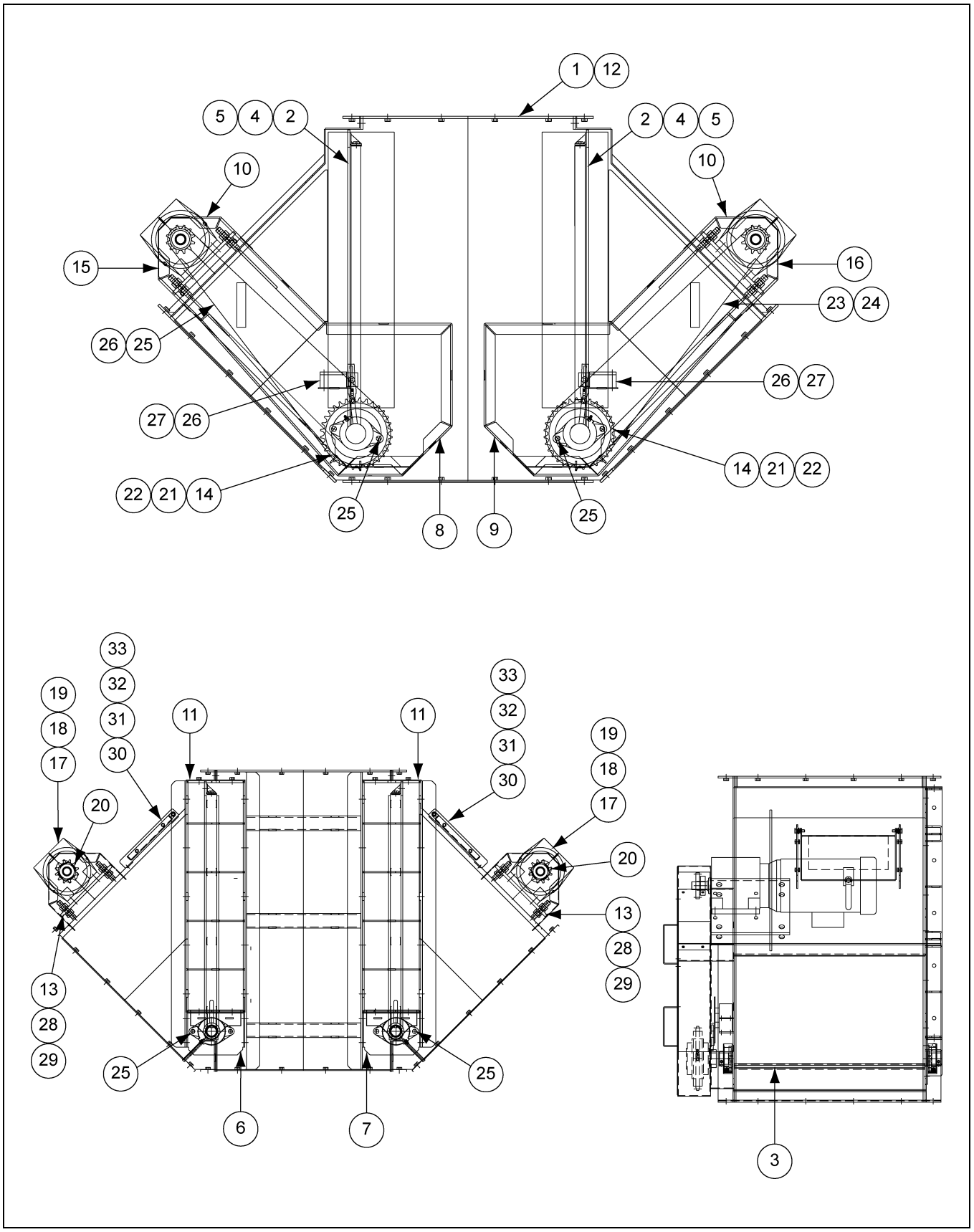
Igntion Source	Ignition Hazard			Control Methods		Operator Intervention Required	Frequency
	Normal Operation	Expected Malfunction	Rare Malfunction	Scope to minimize likelihood of ignition source arising	Scope to minimize the likelihood of ignition source becoming effective		
Surface Temperature							
Ambient Conditions	The valves are designed and specified operation under standard ambient conditions with temperatures ranging from -20°C to +40°C.						
	Under normal operation there is no mechanism or system by which the surface temperature of the valve will exceed ambient conditions i.e. them as much as 1°C.						
Flop Movement	Frictional heating against the side of the valve with normal clearances between flop and valve side and normal flop speed.	Damage/distortion of the valve or flop resulting in reduced clearance and potential interference.	NA	Constructional safety “C”.	Electric and pneumatic actuators have limited power output. Based on the nominal time that it takes for the valve to switch from one position to another and the fact that the valves do not switch regularly, the maximum energy available for frictional heating is limited.	Damaged parts of valve to be replaced or repaired.	As required
				The valve is designed with adequate clearance between the flop and the inside the valve body and with a low relative speed of the flop to the valve body.			
				Under normal operation maximum relative speed is 24 IPS (approximately 0.61 m/s). In accordance with EN ISO 80079-36, paragraph 6.4.2 a relative contact speed of 1 m/s or less is often used as the limit below which frictional sources are capable of igniting an explosive atmosphere.			
				Clearance between the UHMW sides of the flop and the inside of the valve is designed to be close enough to prevent even the smallest grains leaking past whilst at the same time minimizing any excessive friction between the 2 surfaces.			
				The co-efficient of friction of the UHMW material against the galvanised steel (0.3) is significantly lower than that of steel on steel (0.6).			
		Incorrect gear motor resulting in higher speed of flop relative to valve side (electric versions).	NA	Constructional safety “C”. Even under excessive motor/cylinder power increases, the likely surface temperatures will not approach those required for auto-ignition of the grain dust, either in layers or in explosive mixtures with air. Normal motor power is 375W with speed 0.61 m/s, in which the surface temperature rise is seen to increase by < 21°C. If the speed is doubled to 1.22 m/s the rise in temperature increases to approximately 41°C, which on top of the ambient temperature, does not constitute and ignition risk.		Replacement of motor, gear reducer or air cylinder to be like for like to minimize risk of overspeed.	As required
		Incorrect air cylinder resulting in higher speed of flop against valve side (pneumatic versions).	NA				
		Excessive air pressure flow rate resulting in higher speed against the inside valve (pneumatic conversions).	NA				

Igntion Source	Ignition Hazard			Control Methods		Operator Intervention Required	Frequency
	Normal Operation	Expected Malfunction	Rare Malfunction	Scope to minimize likelihood of ignition source arising	Scope to minimize the likelihood of ignition source becoming effective		
Mechanical Sparks							
Spark Generation from Friction of Valve Flop Moving Against Valve Side.	Risk of separation of particles with high enough energy to ignite dust/air mixture.		NA	Constructional safety “C”. Maximum flop speed is 0.61 m/s in normal use and maximum kinetic energy, which could be converted into the energy of the spark is 930 mJ. Design does not allow for high frictional contact between the moving and static parts increased (doubled) speed, increases the kinetic energy to 3600 mJ. Velocity would now exceed the maximum 1m/s, but energy remains significantly below 500 J. The likelihood of this incidence occurring is extremely low and is easily preventable through correct care and maintenance. Electric versions of the valves are fitted with a “torque tamer” clutch which limits the maximum amount of talk that may be delivered by the motor and gearbox to the flop.		Replacement of motor, gear reducer or air cylinder to be like for like to minimize risk of overspeed.	As required
		Incorrect gear motor resulting in higher speed of flop relative to valve side (electric versions).	NA				
		Incorrect air cylinder resulting in higher speed of flop against valve side (pneumatic versions).	NA				
		Excessive air pressure flow rate resulting in higher speed against the inside valve (pneumatic conversions).	NA				
Sparks Generated Through Vibration and Potential Repeated Impact Between the Flop and the Inside of the Valve.	Vibration during normal operation.		NA	Under normal operation the valve operates smoothly and without any vibration.			
	Vibration transmitted through connected equipment such as bucket elevators, augurs and conveyors.		NA	Under normal operation, all equipment connected to the valve, such as bucket elevators, conveyors, and augers, will operate without significant vibration.		Operator to ensure that the valve is suitably isolated or separated from sources of vibration.	On first installation or following modification or relocation.
				However equipment such as sorters, cleaners and graders will operate with a certain amount of intended vibration.			
				Whilst it is unlikely that this vibration could constitute an active ignition source, the operator’s manual will state that the valve should be placed a sufficient distance away from such equipment and/or vibration isolation or damping mounts should be used.			
		Vibration resulting from distortion of the valve and/or flop and resulting “chattering” of the flop as it is moved from one position to another.	NA	Correctly installed, the valve should not be at risk of becoming distorted in such a way that could result in vibration during the movement of the flop.			
				However the user manual shall state the correct methods of installation to ensure that the frame of the valve does not come under stress which could result in distortion.			
				In addition the operator shall check the operation of the valve at least annually to ensure that the flop continues to move smoothly and as intended.			

Igntion Source	Ignition Hazard			Control Methods		Operator Intervention Required	Frequency
	Normal Operation	Expected Malfunction	Rare Malfunction	Scope to minimize likelihood of ignition source arising	Scope to minimize the likelihood of ignition source becoming effective		
Sparks Generated Through Vibration and Potential Repeated Impact Between the Flop and the Inside of the Valve. (Cont'd)		Vibration resulting from other equipment malfunctioning and being transmitted through connected equipment to the valve.	NA	In the event that connected pieces of equipment such as bucket elevators, conveyors and augers are running in such a way as to generate vibration due to malfunction, the operator will be required to stop the system and rectify the fault.			
	Frictional heating in flop shaft bearings - normal operation.		NA	Due to the limited movement of the flop and therefore the low speed and non-frequent rotation of the bearing, the scope for frictional heating is minimal, and does not present a significant risk of ignition.			
		Frictional heating in flop bearings - loss of lubrication.	NA	The bearing is significantly over specified for the application, and therefore the risk of loss of lubrication and the impact of such loss is extremely low.		Operator inspection, maintenance and where necessary replacement of bearings.	Inspection annually maintenance and replacement as required.
				The likelihood of a viable ignition source being created in this situation is low.			
				Routine maintenance and inspection should all but eliminate the risk of the bearing ever running dry.			
Single Impact Sparks.	Collision of the flop with the inside of the valve.	Incorrect gear motor resulting in higher speed of flop relative to valve side (electric versions).	NA	Constructional safety "C". Flop speed is well below the 15m/s given in EN80079-36 (6.4.2.2). Kinetic energy is signifcantly below the 80 J stated for EPL Db in table 7. Increased (doubled) speed, increases the kinetic energy to 3600 mJ. Values remain well below the limits given in EN80079-36 (6.4.2.2) and table 7.		Replacement of motor, gear reducer or air cylinder to be like for like to minimize risk of overspeed.	As required
		Incorrect air cylinder resulting in higher speed of flop against valve side (pneumatic versions).	NA				
		Excessive air pressure flow rate resulting in higher speed against the inside valve (pneumatic conversions).	NA				
Flames/Hot Gases							
None Present							
Electrical Sparks							
Electric Motor			NA	This assessment applies only to the potential explosive environment inside the valve as opposed to that which may exist outside the valve. The electrical components, where used, are outside the valve and therefore are not considered as potential sources of ignition in this assessment. In the event that the valve is to be specified for use within a potentially explosive environment further assessment will be required and selection of suitable electrical equipment specific to the EPL required.			
Limit Switches							
Pneumatic Solenoid Valves							

Igntion Source	Ignition Hazard			Control Methods		Operator Intervention Required	Frequency
	Normal Operation	Expected Malfunction	Rare Malfunction	Scope to minimize likelihood of ignition source arising	Scope to minimize the likelihood of ignition source becoming effective		
Stray Electric Current							
None Present							
Static Electricity							
UHMW Linings	Grain passing over the non-conductive linings is a potential charging process, which may result in the build-up of static electricity on the non-conductive material.		NA	Constructional safety “C”. The primary method of minimising risk of ignition resulting from static electricity, is to ensure that any static charge can be conducted safely directly to earth, minimizing the risk of an incendive spark discharge.			
	Propagating brush discharge from charged lining material on conductive (metallic) surfaces.		NA	Constructional safety “C”. The non-conductive lining used on surfaces of the valve and flop exceed 8 mm thickness. The minimum ignition energy of grain dust will typically be 40 mJ and almost all cases greater than 1 mJ stated in the standard EN80079-36 (6.7.3). Therefore the risk of ignition by propagating brush discharge is not considered to be an active source in these valves, either in normal operation, nor in foreseeable malfunction.			
		Failure/high resistance of PE connection, charge not dissipated.	NA	Redundancy in the PE will provide alternative route to earth for generated electrostatic charge. Protection against propagating brush discharges as detailed above (thickness of material and minimum ignition energy of the dust) reduces the emphasis on the ability of the PE circuit conduct the static electricity safely away.			
	Cone discharge within pile of grain		NA	Cone discharge is not an ignition hazard present in the valves, as these are not storage vessels, and the grain only passes through the valve.			
	Spark discharge from charged lining material via conducting point, such as bolt fixing.		NA	Constructional safety “C”. Static charge generated in the non-conductive lining will pass directly to earth via the bolt/screw, as these are connected directly to the conductive (steel) valve sides and flop.			
		Failure/high resistance of PE connection, charge not dissipated.	NA	Redundancy in the PE will provide alternative route to earth for generated electrostatic charge electricity safely away. Earth leakage resistance will be <<1 M ohm, which is deemed to be low enough to safely dissipate static charging and prevent spark discharge.		Connection and continuity of the PE circuit to all conductive parts of the valve (and connected equipment). Tests on installation should show that the earth resistance is << 1 M ohm to all conductive surfaces.	On installation and commissioning

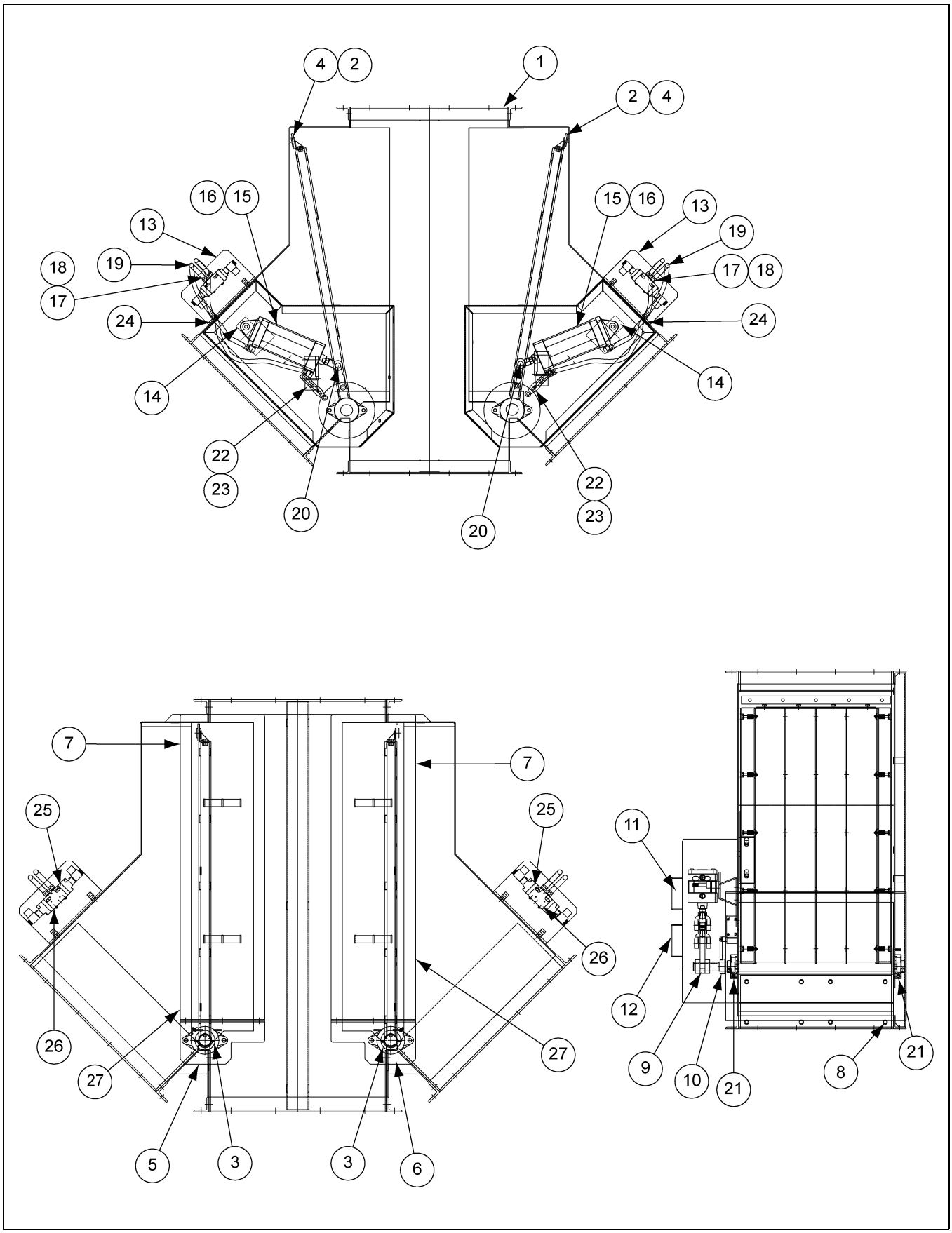
3-Way Valve Electric



3-Way Valve Electric Parts List

Ref #	Description
1	3-Way Valve Weldment
2	3-Way Valve Flop Assembly
3	Valve Seal
4	Flop Retainer End Panel
5	Flop WPR 3-Way Valve
6	Bearing Cover L.H.
7	Bearing Cover R.H.
8	Guard Valve Extension Bolt L.H.
9	Guard Valve Extension Bolt R.H.
10	Guard Valve Reducer
11	Side Panel Valve Opening
12	3-Way Linear Valve
13	Reducer Mount Valve
14	Cam Limit Switch
15	Inspection Door L.H.
16	Inspection Door R.H.
17	Motor
18	Gear Reducer
19	Oil Worm Gear
20	Motor Sprocket
21	Sprocket
22	Torque Tamer
23	Chain Roller
24	Chain Link Connector
25	Bearing Flange Bolt
26	Limit Switch
27	Limit Switch Arm Roller
28	Jam Nut
29	Lock Washer
30	Bolt Pin
31	Inspection Door
32	Inspection Door Clip
33	Seal

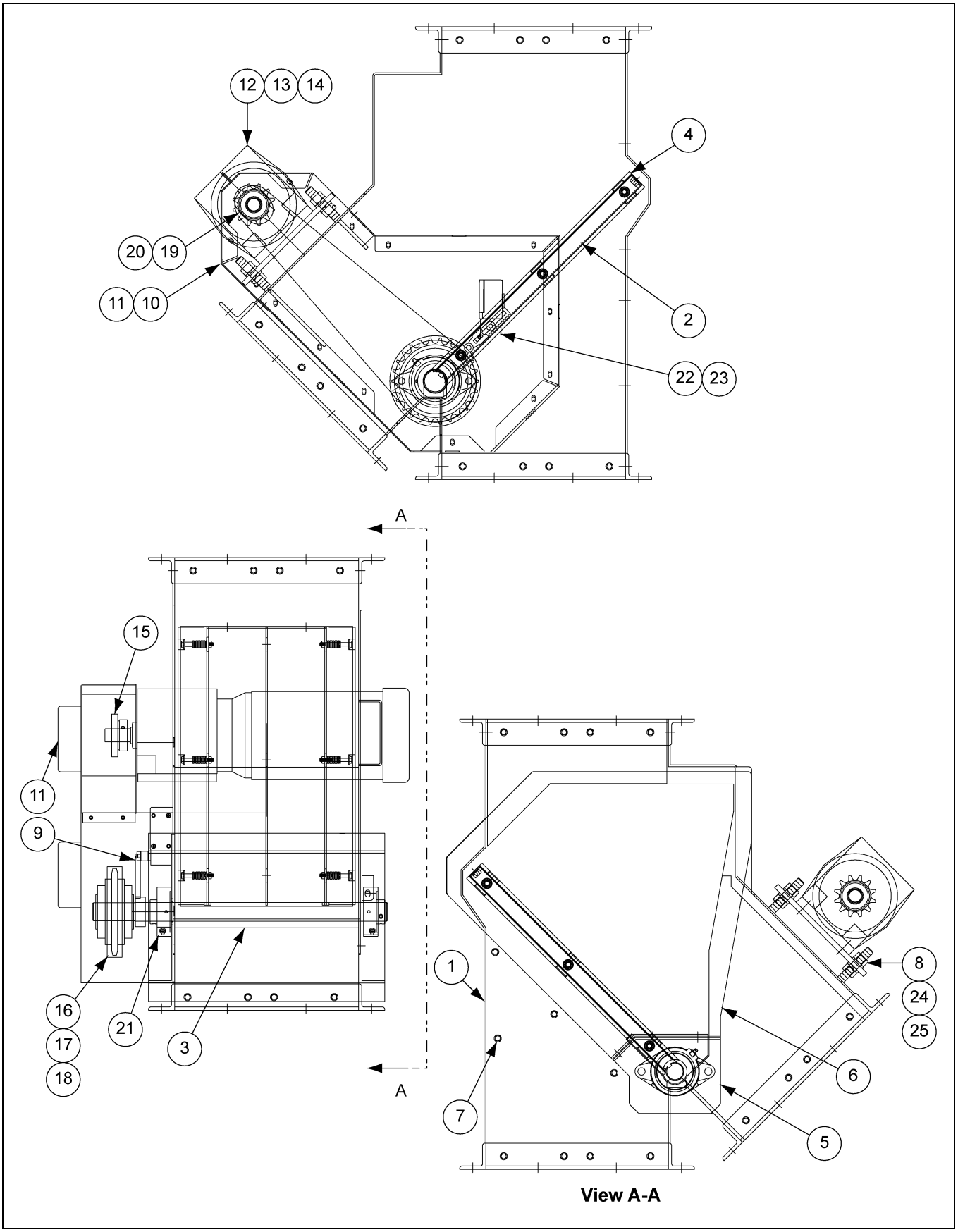
3-Way Valve Pneumatic



3-Way Valve Pneumatic Parts List

Ref #	Description
1	3-Way Valve Weld
2	3-Way Valve Flop Assembly
3	Valve Seal
4	Flop Retainer End Panel
5	Bearing Cover L.H.
6	Bearing Cover R.H.
7	Side Panel
8	3-Way Linear Valve
9	Valve Cylinder Arm
10	Cam Limit Switch
11	Inspection Door L.H.
12	Inspection Door R.H.
13	Air Valve Mount
14	Cylinder Mount
15	Air Cylinder
16	Cylinder Clevis Rod
17	Fit Air Push
18	Brass Pipe Street Elbow
19	Push Lock Air Hose
20	Pivot Pin
21	Bearing Flange Bolt
22	Limit Switch
23	Limit Switch Arm Roller
24	Grommet Groove
25	Air Valve
26	Speed Control
27	Seal

2-Way K-Valve Electric

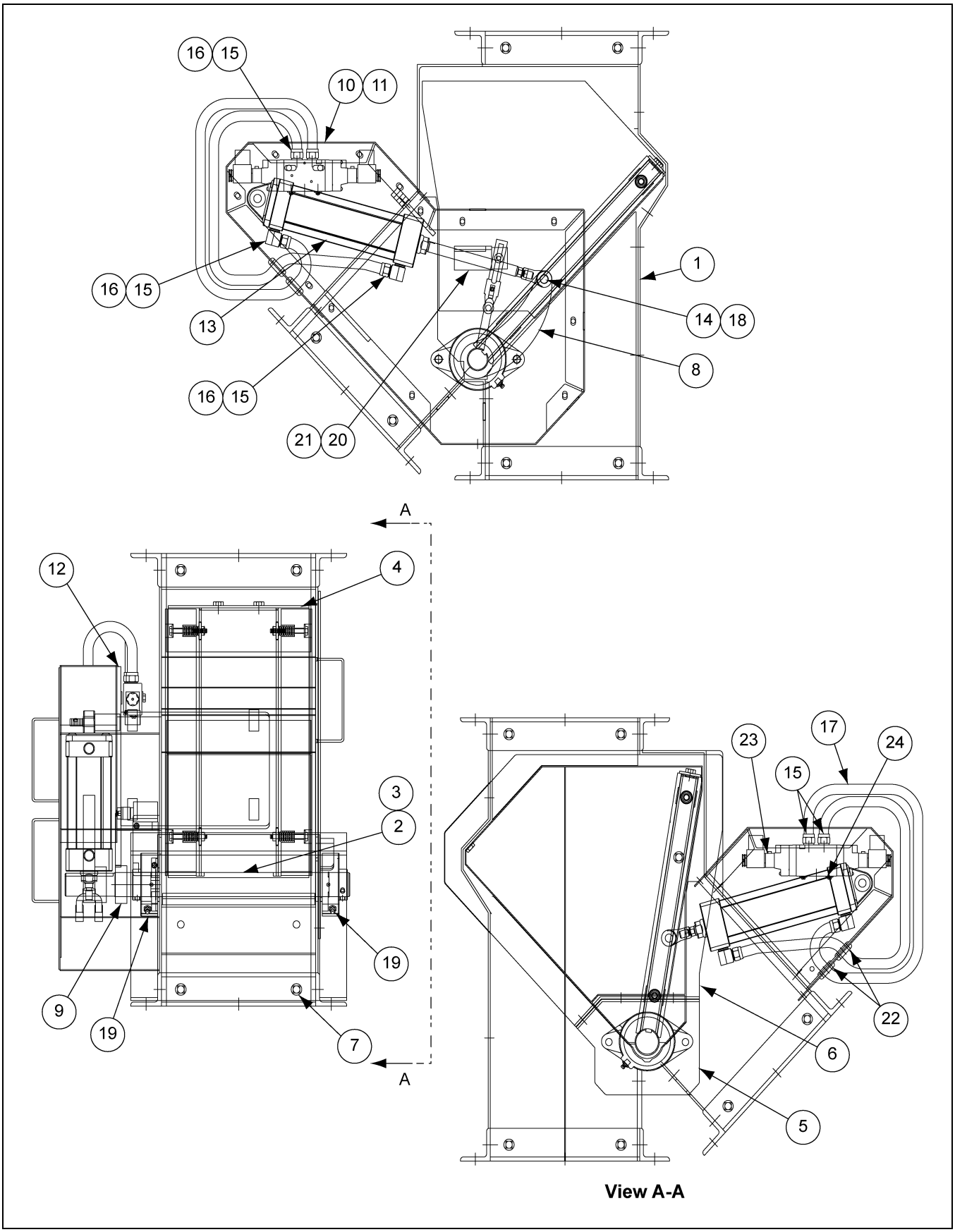


View A-A

2-Way K-Valve Electric Parts List

Ref #	Description
1	Valve Weld Linear
2	Valve Flop Assembly
3	Valve Seal
4	Flop Retainer End Panel
5	Bearing Cover
6	Side Panel
7	Linear Valve
8	Reducer Mount Valve
9	Cam Limit Switch
10	Guard Valve Reducer
11	Inspection Door
12	Motor
13	Gear Reducer
14	Oil Worm Gear
15	Motor Sprocket
16	Sprocket
17	Torque Tamer Clutch
18	Torque Tamer Bushing and Spring
19	Chain Roller
20	Chain Link Connector
21	Bearing Flange Bolt
22	Limit Switch
23	Limit Switch Arm Roller
24	Jam Nut
25	Lock Washer

2-Way K-Valve Pneumatic

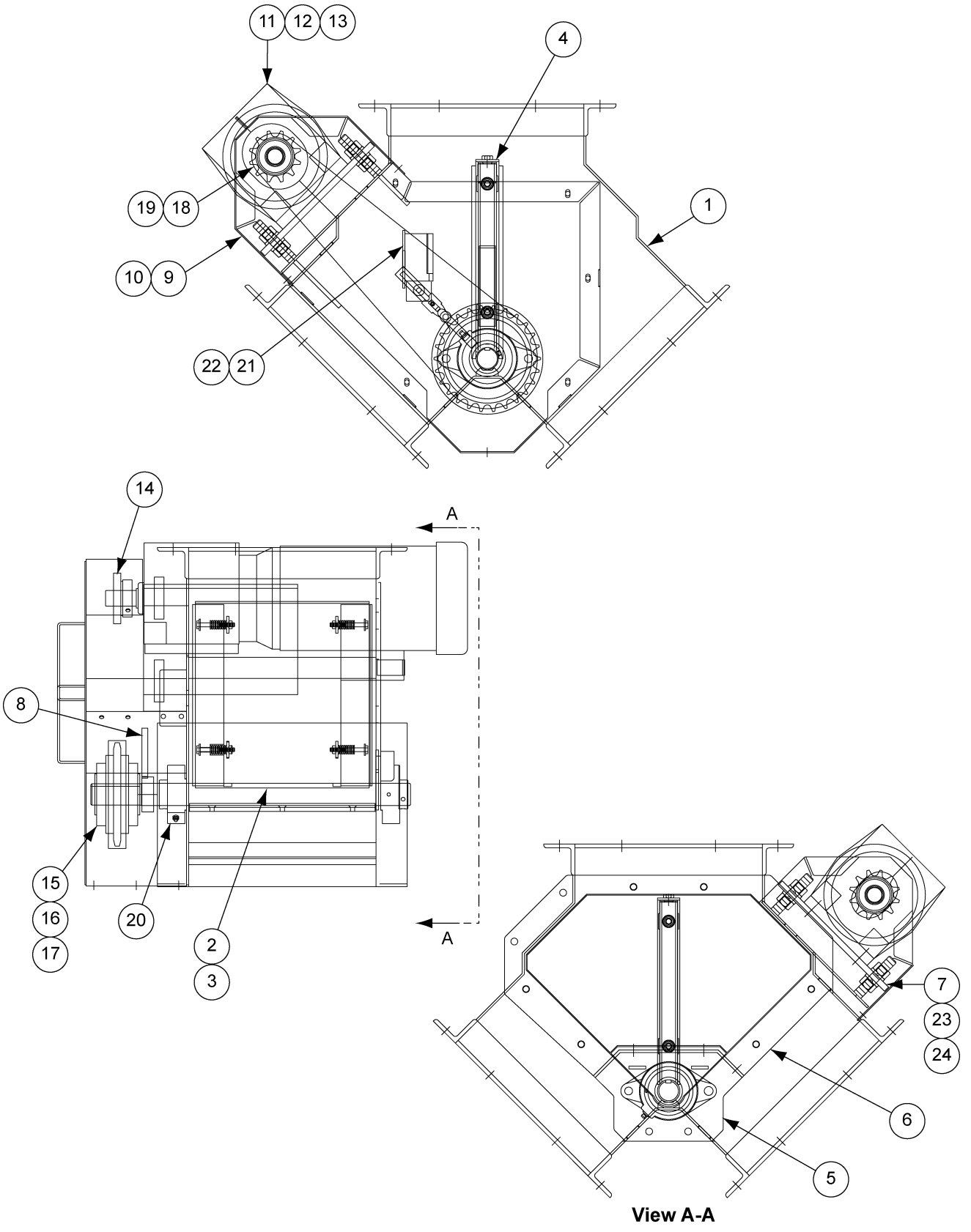


View A-A

2-Way K-Valve Pneumatic Parts List

Ref #	Description
1	Valve Weld
2	Valve Flop Assembly
3	Valve Seal
4	Flop Retainer End Panel
5	Bearing Cover
6	Side Panel
7	Linear Valve
8	Valve Cylinder Arm
9	Cam Limit Switch
10	Valve Guard
11	Inspection Door
12	Cylinder Mount
13	Air Cylinder
14	Cylinder Clevis Rod
15	Air Push Lock
16	Brass Pipe Street Elbow
17	Push Lock Air Hose
18	Pivot Pin
19	Bearing Flange Bolt
20	Limit Switch
21	Limit Switch Arm Roller
22	Grommet Groove
23	Air Valve
24	Speed Control

2-Way Y-Valve Electric

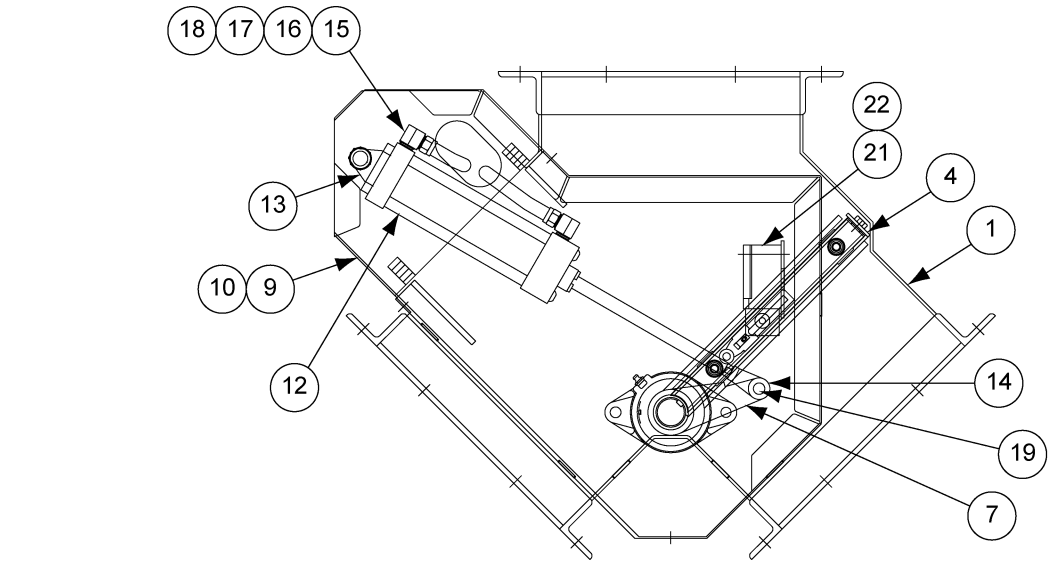


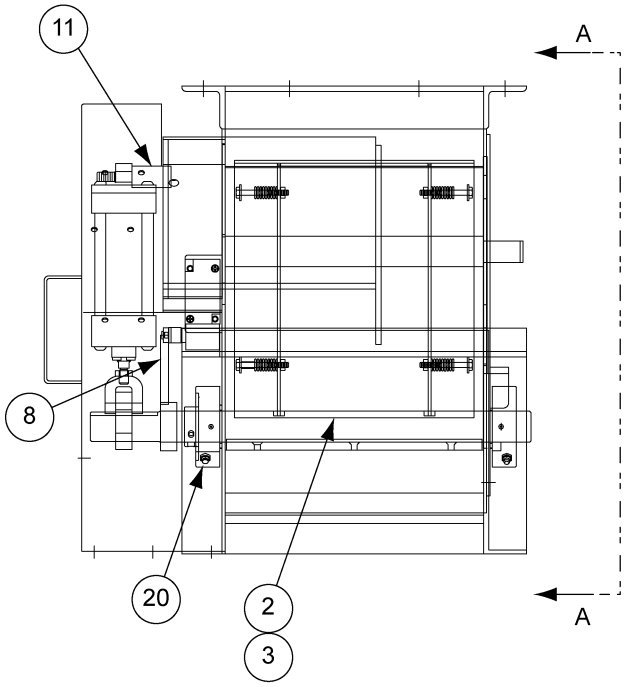
View A-A

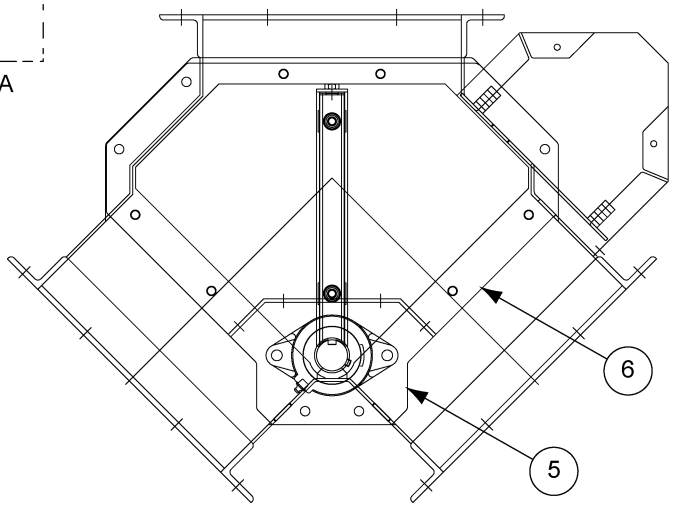
2-Way Y-Valve Electric Parts List

Ref #	Description
1	Valve Weld
2	Valve Flop Assembly
3	Valve Seal
4	Flop Retainer End Panel
5	Bearing Cover
6	Side Panel
7	Reducer Mount Valve
8	Cam Limit Switch
9	Guard Valve Reducer
10	Inspection Door
11	Motor
12	Gear Reducer
13	Oil Worm Gear
14	Motor Sprocket
15	Sprocket
16	Torque Tamer Clutch
17	Torque Tamer Bushing
18	Chain Roller
19	Chain Link Connector
20	Bearing Flange Bolt
21	Limit Switch
22	Limit Switch Arm Roller
23	Jam Nut
24	Lock Washer

2-Way Y-Valve Pneumatic







View A-A

2-Way Y-Valve Pneumatic Parts List

Ref #	Description
1	Valve Weldment
2	Valve Flop Assembly
3	Valve Seal
4	Flop Retainer End Panel
5	Bearing Cover
6	Side Panel
7	Valve Cylinder Arm
8	Cam Limit Switch
9	Valve Guard
10	Inspection Door
11	Cylinder Mount
12	Air Cylinder
13	Cylinder Mounting Plate
14	Cylinder Clevis Rod
15	Air Push Lock
16	Brass Pipe Street Elbow
17	Pipe Nipple
18	Push Lock Air Hose
19	Pivot Pin
20	Bearing Flange Bolt
21	Limit Switch
22	Limit Switch Arm Roller

Electric

Problem	Possible Cause	Corrective Action
Material leaks from the valve.	Diverter blade is not closed properly.	Check for the proper functioning of the diverter blade.
Slow working of the diverter.	Material or debris jammed inside the diverter blade.	Remove the lodged material or debris.
	Jammed bearing.	Lubricate/replace the bearing.
	May need lubrication.	Lubricate the drive sprocket and shaft.
If the motor stops frequently.	Armature windings are shorted.	Use the proper voltage for the motor. Re-wind the motor by consulting a licensed Electrician.
	The motor is not receiving full voltage.	A light gauge wire can cause a voltage drop-consult a licensed electrician.
If the gear reducer is excessively hot.	The gear reducer is not properly lubricated.	Lubricate the gear reducer properly.
	The chain may be too tight.	Adjust the chain by adding a few links as directed.

Pneumatic

Problem	Possible Cause	Corrective Action
Material leaks from the valve.	Diverter blade is not closed properly.	Check for the proper functioning of the diverter blade.
Slow working of the diverter.	Material or debris jammed inside the diverter valve.	Remove the lodged material or debris.
	O-ring/seal worn out in cylinder.	Replace the seal/O-ring.
	Leakage in pneumatic lines.	Repair/replace the lines.
	Air pressure is OFF, too low or interrupted.	Check for pinched airline, or cut airline.
	Pneumatic actuator is in-operative.	Check for the damage of pneumatic actuator.
Slow or inconsistent cylinder speed.	Air leaks in pneumatic lines.	Repair/replace lines.

Failure to perform any or all of these pre-start checks may cause damage to the equipment and/or cause SERIOUS INJURY or DEATH to those in the work area.

Failure to perform any or all of these pre-start checks may also be a misuse of the equipment. Any misuse of the equipment may void the warranty.

Once you are sure that all installations, safety checks, adjustments and lubrications have been completed:

1. Ensure all connections are securely fitted.
2. Check the valve for any leakage.
3. Look and listen for any irregularities before running any material through the unit.
4. Monitor the pressure level before operating the valve.
5. Properly vent all systems before starting work.

Normal Shut Down

1. Before shutting down the unit, make certain that the valves are closed.
2. Turn OFF all control valves and lock out the power source before leaving the work area.

Emergency Shut Down

1. Turn OFF all control valves and lock out the power source.

Lock Out

1. Always turn OFF control valves and lock out the power source before leaving the work area or before performing any maintenance or service.

ALWAYS shut down and disconnect the power supply before adjusting, servicing or cleaning the equipment.

The care and maintenance section is provided to help extend the life of the unit. Like all equipment, the useful life of the valve assemblies are greatly reduced if not used properly and well-maintained.

The *below* steps to ensure the safety and longevity of the equipment:

1. Make sure that ALL components are in good working condition before use.
2. Check all bearings and moving parts daily, during use.
3. Verify the pressure ratings of hoses, fittings, gaskets and other manifold materials.
4. Check for any structural damage, rust or corrosion.

Welding

Remove paint before welding or heating. Toxic fumes can be generated when paint is heated by welding, soldering, or using a torch. Always wear an approved respirator and work in well-ventilated area.

1. Welding on or to the valve may cause damage to both the valve assembly and its systems.
2. If welding is necessary, measures should be taken to protect the valve assembly. Should it be necessary to fasten anything to the valve permanently, careful consideration should be given to methods of maintenance, removal and replacement of the assembly and/or its parts.

Limit Switch Adjustment

Loosen and adjust the limit switch arm if required. The limit switch should trip and remove power from the motor/cylinder thus stopping the rotation.

Inspection Door

ALWAYS shut down the machine and disconnect the power supply before opening the inspection door to avoid serious injury.

1. A removable access door allows internal inspection or maintenance of the valve without having to take it out of place.
2. The inspection door allows for quicker access to the interior of the valve for inspection, cleaning or maintenance purposes.

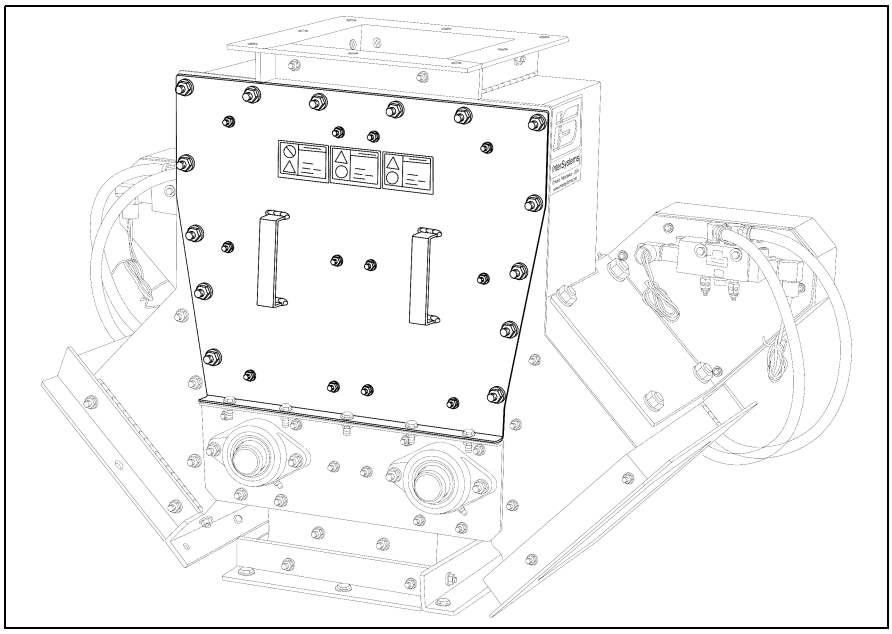


Figure 10A *Block Head Inspection Door*

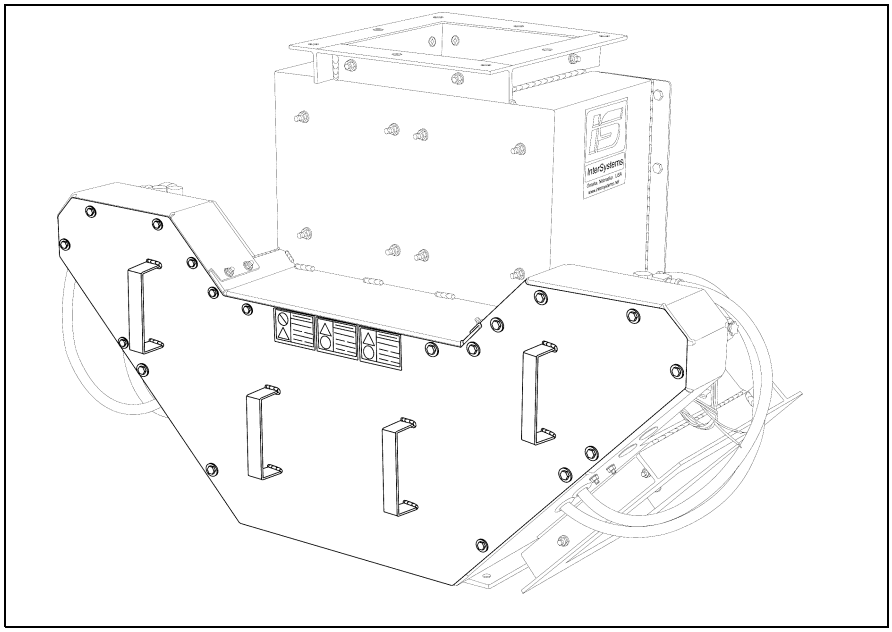


Figure 10B *Control System Inspection Door*

NOTES

InterSystems, Inc. reserves the right to make changes in design or in construction of equipment and components without obligation to incorporate such changes in equipment and components previously ordered.

WARRANTY, LIMITATION OF LIABILITY, DISCLAIMER OF IMPLIED WARRANTIES: InterSystems, Inc. manufactured equipment and components are guaranteed against defects in workmanship or materials for one year from date of shipment. The obligation of InterSystems, Inc. with respect to any goods is limited to replacement or repair of defective parts and equipment provided those parts are returned, shipping costs prepaid, to InterSystems' factory and provided the product has not been subject to misuse, negligence, or accident, or repaired or altered outside of our factory, or other than by an Authorized Service Representative. This warranty does not cover the replacement of parts inoperative because of wear occasioned by use, the cost of replacing parts by a person other than an InterSystems employee or an Authorized Service Representative, or the adjustment of a product where the product was improperly adjusted by the purchaser. In addition, this warranty does not cover components manufactured by others such as motors, drives, clutches, cylinders, valves, blowers, and the like. On those components the standard Manufacturers' warranty applies. In any event, liability is limited to the purchase price paid, and InterSystems, Inc. will, under no circumstances, be responsible for special or consequential damages, or for incidental damages.

INTERSYSTEMS, INC. NEITHER MAKES NOR AUTHORIZES ANY WARRANTY OTHER THAN AS HEREIN CONTAINED. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

This equipment shall be installed in accordance with the current installation codes and applicable regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

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