EFFECTIVE: January 17, 2017

OWNER'S MANUAL

MOTORIZED AIR TROLLEY MAL/MAS SERIES

¼ Ton through 5 Ton Capacity

Code and Serial Number

⚠ WARNING

This equipment should not be installed, operated or maintained by any person who has not read and understood all the contents of this manual. Failure to read and comply with the contents of this manual can result in serious bodily injury or death, and/or property damage.

HARRINGTON
A KITO GROUP COMPANY

IMPORTANT INFORMATION ON HOW TO USE THIS MANUAL

This OWNER'S MANUAL is intended for the MAL/MAS Air Trolley used with the AL/AS Air Hoist as an ALM/ASM model Air Trolley Hoist. No other hoist and trolley combinations are covered in this manual. References to the "Owner's Manual for the Air Powered Chain Hoist AL/AW/AS Series" will be designated by the use of the acronym "**ALAWASOM**".

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1.0 Important Information and Warnings

1.1 Terms and Summary

This manual provides important information for personnel involved with the installation, operation and maintenance of this product. Although you may be familiar with this or similar equipment, it is strongly recommended that you read this manual before installing, operating or maintaining the product.

Danger, Warning, Caution and Notice - Throughout this manual there are steps and procedures that can present hazardous situations. The following signal words are used to identify the degree or level of hazard seriousness.

⚠ DANGER Danger indicates an imminently hazardous situation which, if not avoided, ***will*** result in ***death or serious injury***, and property damage.

⚠WARNING Warning indicates an imminently hazardous situation which, if not avoided, ***could*** result in ***death or serious injury***, and property damage.

⚠ CAUTION Caution indicates a potentially hazardous situation which, if not avoided, ***may*** result ***minor or moderate injury*** or property damage.

NOTICE Notice is used to notify people of installation, operation, or maintenance information which is important but not directly hazard-related.

⚠ CAUTION

These general instructions deal with the normal installation, operation, and maintenance situations encountered with the equipment described herein. The instructions should not be interpreted to anticipate every possible contingency or to anticipate the final system, crane, or configuration that uses this equipment. For systems using the equipment covered by this manual, the supplier and owner of the system are responsible for the system's compliance with all applicable industry standards, and with all applicable federal, state and local regulations/codes.

This manual includes instructions and parts information for a variety of trolley and hoist types. Therefore, all instructions and parts information may not apply to any one type or size of specific trolley or hoist. Disregard those portions of the instructions that do not apply.

Record your trolley's Code and Serial Number on the front cover of this manual for identification and future reference to avoid referring to the wrong manual for information or instructions on installation, operation, inspection, maintenance, or parts.

Use only Harrington authorized replacement parts in the service and maintenance of this trolley.

⚠ WARNING

Equipment described herein is not designed for and **MUST NOT** be used for lifting, supporting, or transporting people, or for lifting or supporting loads over people.

Equipment described herein should not be used in conjunction with other equipment unless necessary and/or required safety devices applicable to the system, crane, or application are installed by the system designer, system manufacturer, crane manufacturer, installer, or user.

Modifications to upgrade, rerate, or otherwise alter this equipment shall be authorized only by the original equipment manufacturer.

Equipment described herein may be used in the design and manufacture of cranes or monorails. Additional equipment or devices may be required for the crane and monorail to comply with applicable crane design and safety standards. The crane designer, crane manufacturer, or user is responsible to furnish these additional items for compliance. Refer to ANSI/ASME B30.17, "Safety Standard for Top-Running Single Girder Cranes"; ANSI/ASME B30.2 "Safety Standard for Top-Running Double-Girder Cranes"; and ANSI/ASME B30.11 "Safety Standard for Underhung Cranes and Monorails".

If a below-the-hook lifting device or sling is used with a hoist, refer to ANSI/ASME B30.9, "Safety Standard for Slings" or ANSI/ASME B30.20, "Safety Standard for Below-the-Hook Lifting Devices".

Hoists, trolleys and cranes, used to handle hot molten material may require additional equipment or devices. Refer to ANSI Z241.2, "Safety Requirements for Melting and Pouring of Metals in the Metalcasting Industry".

Special Conditions for using the hoist/trolley in a potentially explosive environment according to its ATEX rating:

- Non-compliance with any of these "Special Conditions" could result in ignition of potentially explosive atmospheres
- The hoist must be used according to the operating conditions recommended in this manual. Exceeding the recommended temperatures or air pressure could result in increased surface temperatures and the hoist can become an ignition source.
- Ensure the hoist is grounded to the equipotential bonding system of the workspace (for example, through accessories such as hoses and air-pressure connections) to prevent ignition hazards from electrostatic discharge.
- Do not allow hard contact of the bottom block, hook, load chain or pendant against other objects. The impact of any hoist component beyond normal use may cause an ignition hazard from sparks.
- If the hoist is installed with a trolley or part of other equipment, ensure that the entire equipment complies with the ATEX requirements needed for the application.
- Regular hoist inspection and maintenance is required to maintain the ATEX rating. That includes checking the hoist for correct operation, and where appropriate, repairs as necessary, to maintain proper material coatings (plating and lubrication), to ensure protection from corrosion, wear, resistance, electrical conductivity, impact strength, ageing resistance and effects of temperature variation. (Examples: material plating loss due to wear will remove resistance to corrosion, spark resistance; lack of bearing lubrication could lead to increased operating temperatures, reducing spark resistance).
- If elevated temperatures or elevated vibration levels are detected, shut the hoist off and discontinue its use until it can be inspected and/or repaired.
- See **Paragraph 1.3** for more ATEX related information.

Failure to read and comply with any one of the limitations noted herein can result in serious bodily injury or death, and/or property damage.

⚠ DANGER

HAZARDOUS AIR PRESSURE IS PRESENT IN THE HOIST, IN THE SUPPLY OF COMPRESSED AIR TO THE HOIST, AND IN THE CONNECTIONS BETWEEN COMPONENTS.

Before performing ANY maintenance on the equipment, de-energize the supply of compressed air to the equipment, and lock and tag the supply device in the de-energized position. Refer to ANSI Z244.1, "Personnel Protection - Lockout/Tagout of Energy Sources."

Only trained and competent personnel should inspect and repair this equipment.

NOTICE

It is the responsibility of the owner/user to install, inspect, test, maintain, and operate a trolley or hoist in accordance with ANSI/ASME B30.16, "Safety Standard for Overhead Hoists", OSHA Regulations. If the trolley is installed as part of a total lifting system, such as an overhead crane or monorail, it is also the responsibility of the owner/user to comply with the applicable ANSI/ASME B30 volume that addresses that type of equipment.

It is the responsibility of the owner/user to have all personnel that will install, inspect, test, maintain, and operate a hoist read the contents of this manual and applicable portions of ANSI/ASME B30.16, "Safety Standard for Overhead Hoists" and OSHA Regulations. If the trolley is installed as part of a total lifting system, such as an overhead crane, the applicable ANSI/ASME B30 volume that addresses that type of equipment must also be read by all personnel.

If the trolley owner/user requires additional information, or if any information in the manual is not clear, contact Harrington or the distributor of the trolley. Do not install, inspect, test, maintain, or operate this trolley unless this information is fully understood.

A regular schedule of inspection of the trolley in accordance with the requirements of ANSI/ASME B30.16 should be established and records maintained.

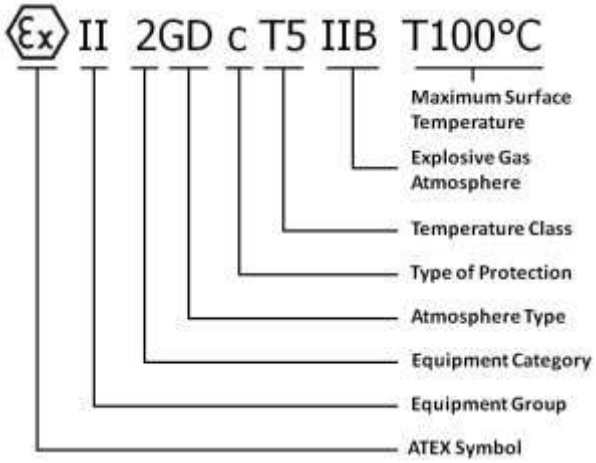
1.2 Explanation of ATEX Directive and Markings

Hoists/trolleys intended for use in potentially explosive atmospheres require measures to reduce the risk of explosions. Requirements for such measures come from the European Directive 94/9/EC, commonly referred to as the ATEX Directive (ATEX is from the French ATmospheres EXplosibles), and its supporting standards.

The explosion protection and prevention measures for non-electrical equipment such as air hoists/trolleys differ from those applied to electrical equipment. Requirements for non-electrical equipment are provided in the EN 13463 series of standards. Air hoists/trolleys that meet the appropriate requirements of the EN 13463 standards satisfy the ATEX Directive and can be used in potentially explosive atmospheres.

Harrington's AL(M)/AW/AS(M) hoists/trolleys use the "constructional safety" type of protection in accordance with EN 13463-5 *Non-electrical equipment intended for use in potentially explosive atmospheres - Part 5: Protection by constructional safety 'c'*. This standard defines constructional safety as ignition protection in which constructional measures are applied so as to protect against the possibility of ignition from hot surfaces, sparks and adiabatic compression generated by moving parts. Constructional measures that satisfy EN 13463-5 include use of materials that reduce or eliminate the risk of sparks produced by impact or friction. This can generally be considered equivalent to the term "spark-resistant features."
The ATEX Directive and the EN 13463 standards require detailed markings to assure the hoists/trolleys are used correctly. These markings define the applications, the type and duration of the potentially explosive atmospheres, the type of protection, and the maximum surface temperature.
Reference Table 1-1 for ATEX marking explanation.

Table 1-1 ATEX Rating Explanation



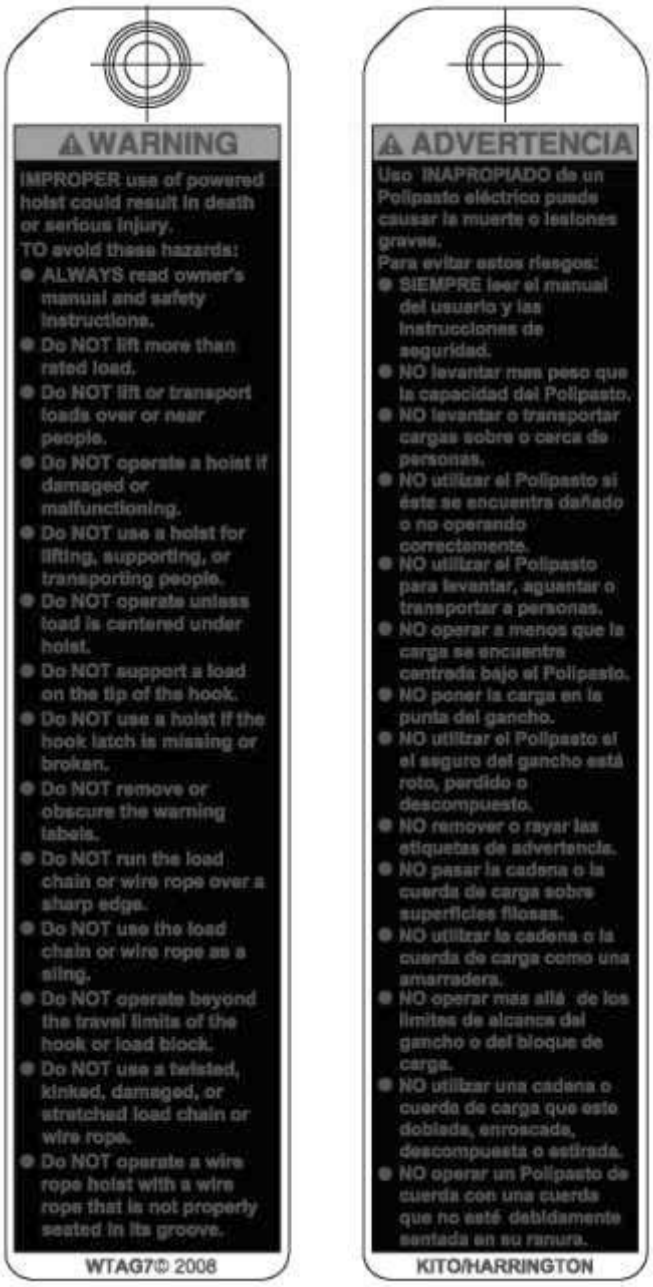
Marking	Definition	ALM Hoist/ trolley	ASM Hoist/ trolley
ATEX Symbol	Equipment suitable for potentially explosive atmospheres in accordance with the ATEX Directive.	Ex	Ex
Equipment Group	'I' means suitable for use in mines susceptible to firedamp and/or coal dust. 'II' means suitable for non-mine locations that could be endangered by potentially explosive atmospheres.	II	II
Equipment Category	'1' means for use in areas where an explosive atmosphere is present continuously, for long periods, or frequently. '2' means for use in areas where an explosive atmosphere is likely to occur in normal operation. '3' means for use in areas where an explosive atmosphere is unlikely to occur in normal operation.	2	2
Atmosphere Type	'G' means suitable for Gas. 'D' means suitable for Dust.	GD	GD
Type of Protection	This letter indicates the type of protection method used. There are several. "c" means constructional safety.	c	c
Temperature Class	Designation that indicates the maximum surface temperature the hoist will have during normal operation. There are several designations. T5 = 100°C	T5	T5
Explosive Gas Atmosphere	Designation that indicates the type of gases, vapors and mists the hoist is suitable for. Designations applicable to Equipment Group II: 'IIA' means atmosphere containing methane, propane, or similar gases. 'IIB' means atmosphere containing ethylene or similar gases. 'IIC' means atmospheres containing hydrogen, acetylene, or similar gases.	IIB	IIC
Maximum Surface Temperature	The maximum surface temperature the hoist will have during normal operation.	T100°C	T100°C

Actual ALM (MAL and AL) Nameplate Marking: II 2GD c T5 IIB T100°C

Actual ASM (MAS and AS) Nameplate Marking: II 2GD c T5 IIC T100°C

1.3 Warning Tag and Labels

The warning tag illustrated below in Figure 1-1 is supplied with each trolley shipped from the factory. If the tag is not attached to the pendant cord for your hoist/trolley, order a tag from your dealer and install it. Read and obey all warnings attached to this trolley. Tag is not shown actual size.



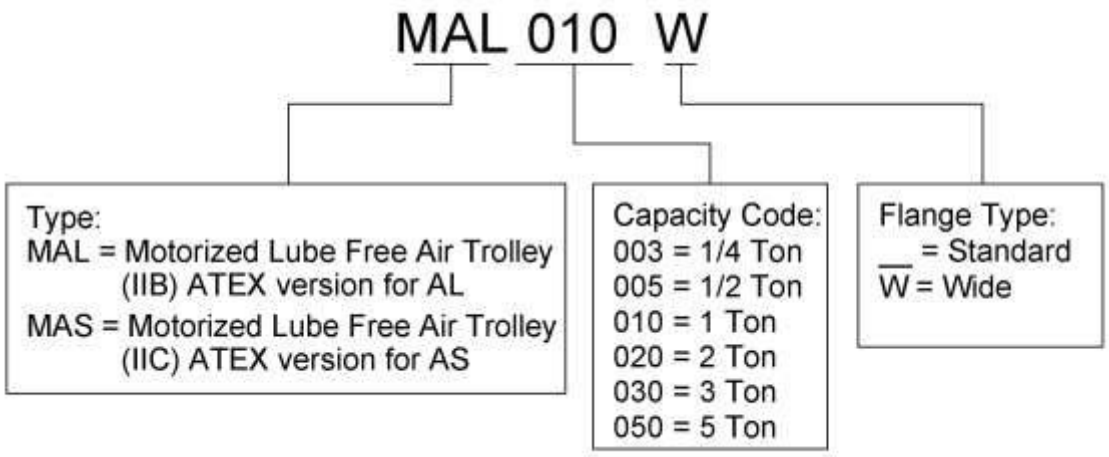
front back

Figure 1-1 Warning Tag Attached to Hoist

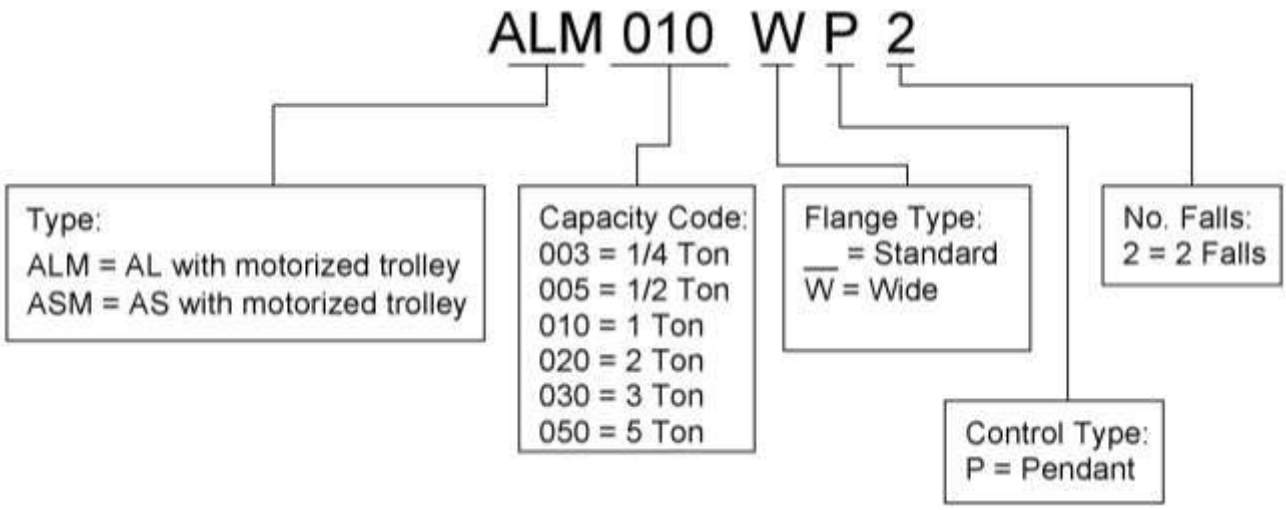
2.0 Technical Information

2.1 Specifications

2.12.1 Product Code for MAL/MAS Trolley Alone:



2.12.2 Product Code for MAL/MAS Air Trolley with AL/AS Series Air Hoist:



*Note: ¼ ton through 1 ton models are referred to as “small body” units
2 ton through 5 ton models are referred to as “large body” units

Table 2-1 Trolley Hoist Specifications

Cap. (Tons)	Product Code	Standard Lift (ft)	Push Button Hose L (ft)	Up/Down Speeds (ft/min @ 90 psi)		Traversing Speed (ft/min)	Air Consumption Rates (cfm @ 90 psi)			Flange Width Adjustability B* (in)	Minimum Allow. Radius for Curve (in)	Load Chain Diameter (mm) x Chain Fall Lines	Net Weight* (lbs)	Weight for Additional One Foot of Lift (lbs)
							Hoist		Trolley					
				No Load	Full Load		No Load	Full Load	No Load Full Load					
1/4	A(L/S)M003(W)P	10	7.5	85 / 66	61/ 105	45.9	98 / 64	78 / 72	17	2.0 to 6.3 (6.3 to 11.1)	50	6.5x1	63.3 (66.1)	0.6
1/2	A(L/S)M005(W)P			78 / 49	41 / 72		102 / 68	81 / 74	17			6.5x1		0.6
1	ALM010(W)P2			39 / 25	21 / 36		102 / 68	81 / 74	17			6.5x2	78.9 (81.8)	1.2
2	ALM020(W)P		8.5	20 / 18	14 / 20	58.4	102 / 76	103 / 85	74	2.9 to 7.1 (7.1 to 11.8)	86.6	11.5x1	228.6 (236.3)	1.9
3	ALM030(W)P			20 / 18	10 / 22	58.4	102 / 76	86 / 87	74	2.9 to 7.1 (7.1 to 11.8)	86.6	11.5x1	228.6 (236.3)	1.9
5	ALM050P2			9.8 / 8.9	5.2 / 9.8	53.1	102 / 76	85 / 81	74	7.1 to 11.8	98.4	11.5x2	397.1	3.8

2.12.3 Operating Conditions and Environment

Temperature Range: +14° to +140°F (-10° to +60°C)
Humidity: 85% or less
Supply Air: 90 psi

2.2 Dimensions

Table 2-2 Trolley Hoist Dimensions

Cap. (Tons)	Product Code	Headroom C (in)	b (in)	b' (in)	d (in)	e* (in)	e' (in)	g (in)	h (in)	i (in)	j (in)	j' (in)	k (in)	m (in)	n (in)	q (in)	r (in)	t (in)
1/4	A(L/S)M003(W)P	16.8	10.4	11.3	10.7	1.7 (1.3)	1.1	1.1	4.1	2.8	1.1	0.8	3.4	1.9	5.1		2.0	1.2
1/2	A(L/S)M005(W)P	16.8	10.4	11.3	10.7	1.7 (1.3)	1.1	1.1	4.1	2.8	1.1	0.8	3.4	1.9	5.1		2.0	1.2
1	ALM010(W)P2	19.5	10.4	11.3	10.7	1.7 (1.3)	1.1	1.1	4.1	2.8	1.1	0.8	3.4	1.9	5.1		2.0	1.2
2	ALM020(W)P	25.6	15.1	16.7	8.2	1.7 (1.4)	1.2	2.0	6.3	4.5	1.6	1.2	5.4	2.3	7.1	23.6	3.0	1.7
3	ALM030(W)P	25.6	15.1	16.7	8.2	1.7 (1.4)	1.2	2.0	6.3	4.5	1.6	1.2	5.4	2.3	7.1	23.6	3.0	1.7
5	ALM050P2	34.6	17.9	19.4	8.4	1.6	1.5	2.4	7.5	5.5	2.0	1.3	6.5	2.8	8.5	23.6	3.7	1.9

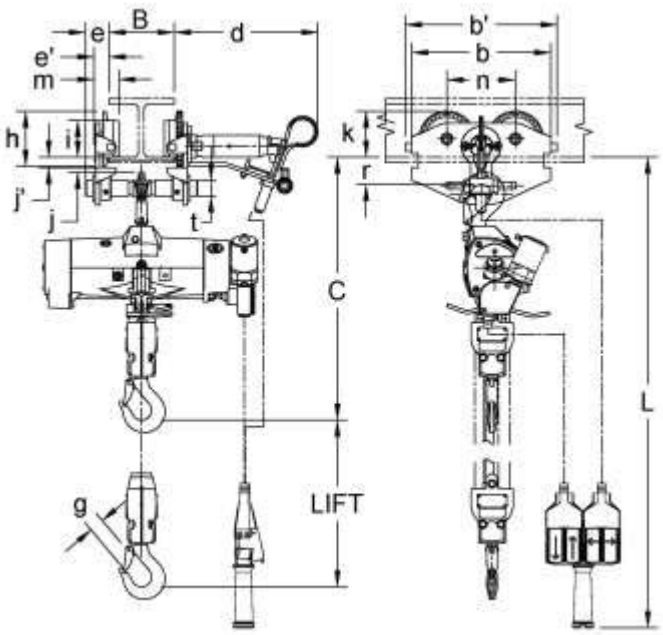


Figure 2-1 **ALM010P2**

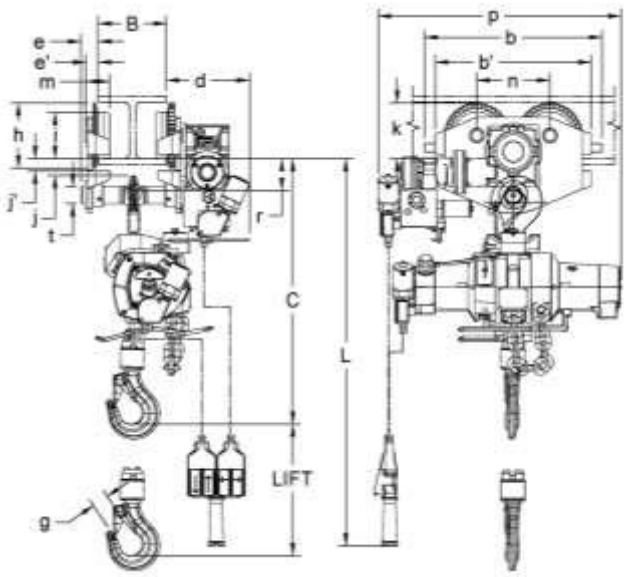


Figure 2-2 **ALM030P**

3.0 Pre-operational Procedures

3.1 Environmental Classification

3.12.1 Consult a qualified person to determine ATEX requirements for your specific application/environment.

3.12.2 Ensure the hoist/trolley's ATEX rating is suitable for the environmental classification. Refer to the hoist/trolley nameplate for ATEX rating and reference **Section 1.3** for explanation of ATEX directives and marking.

3.2 Assembly and Adjustment

3.2.1 When the MAL/MAS trolley is combined with a hoist, follow and complete all pre-operational procedures provided with the hoist. For Harrington AL/AS model hoists, follow the pre-operational procedures in the AL/AW/AS Owner's Manual in conjunction with all information provided in this section for mounting and air hose connections.

3.2.2 In addition to the information and procedures provided in this section for the MAL/MAS trolley, there are specific details for using AL/AS hoists with MAL/MAS trolleys. Special mounting and air hose considerations must be taken if the trolley is used with a hoist other than an AL/AS model.

3.2.3 Trolley Assembly

1) Refer to **Figure 3-1** for instructions #2-5 listed below.

2) Lubricate the threads in the trolley side plates (1 and 2) and screw the shaft (7) approximately 0.39" (10mm) into the "undriven" end piece and 0.20" (5 mm) into the "driven" end piece.

Note: Side plates and shaft are right-hand threaded and left-hand threaded, respectively. The "driven" side plate is right-hand threaded.

3) Before mounting the hoist, turn the shaft (7) until the dimension (A) between the wheels and the beam is:

Trolley Model	Dimension (A)
MA(L/S)003(W),MA(L/S)005(W), MAL010(W)	0.039"-0.059" (1-1.5 mm)
MAL020(W), MAL030(W), MAL050	0.059"-0.079" (1.5-2 mm)

4) Align the hook position notch (B) of the shaft upwards so that the saddle of suspension hook rests within this notch.

5) Push the lock plugs (8) into the side plates. Screw in the lock screws (9) and tighten them to lock the shaft (7).

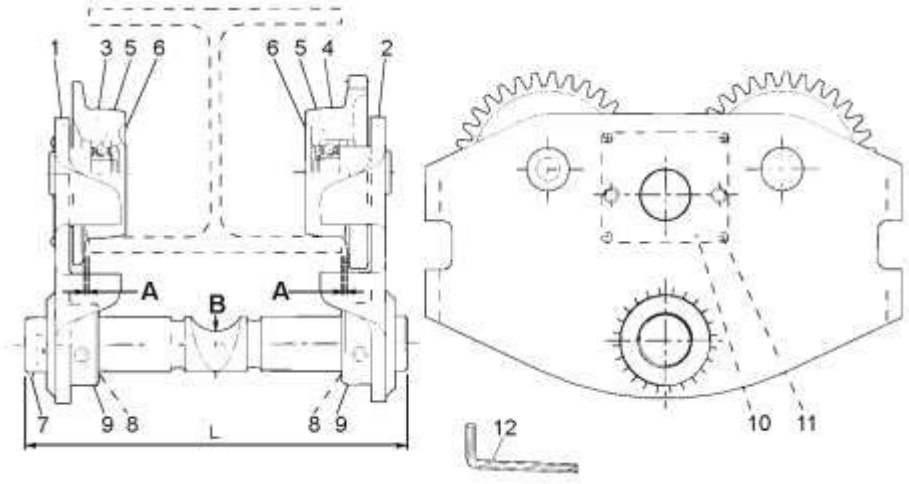


Figure 3-1 Assembling the Trolley

3.3 Mounting Location

3.3.1 **⚠WARNING** Prior to mounting the trolley (and hoist) ensure that the trolley beam and its supporting structure are adequate to support the trolley, hoist and its loads. If necessary consult a professional that is qualified to evaluate the adequacy of the suspension location and its supporting structure.

3.3.2 **NOTICE** See Section 6.3 for outdoor installation considerations.

3.4 Installation of Trolley onto Beam

3.4.1 Assemble and adjust the trolley before attempting to install the trolley on the beam.

3.4.2 Preferred Method – Sliding the trolley connected with the air chain hoist onto the traversing beam from the beam end is the most convenient and recommended method. If the trolley can be mounted from the end of the beam then: Remove the trolley end-stop from the beam and set the trolley on the beam from the end. Securely re-install the trolley end stop on the beam.

3.4.3 Optional Method – If the trolley cannot be mounted from the end of the beam, refer to Figure 3-1 and complete the installation as follows:

1) Raise the trolley on the beam so that the wheels (3 and 4) are above the lower flange of the beam. Turn the shaft (7) until the dimension (A) between the wheels and the beam is 0.039”-0.059” (1-1.5 mm) for small body units and 0.059”-0.079” (1.5-2 mm) for large body units.

Note – Check that the shaft has full thread engagement in the trolley side plates.

2) Align the hook position notch (B) of the shaft upwards so that the saddle of suspension hook rests within this notch.

3) Push the lock plugs (8) into the end pieces. Screw in the lock screws (9) and tighten them to lock the shaft (7).

Note – Before using the lifting device, check that any necessary end stops have been fitted to the beam.

3.5 Air Connections

3.5.1 **⚠ CAUTION** Ensure that the air supply pressure and volume is proper for the hoist or trolley.

3.5.2 **⚠ DANGER** Before proceeding, ensure that the air supply for the hoist or trolley has been de-energized (disconnected). Lock out and tag out in accordance with ANSI Z244.1 “Personnel Protection -Lockout/Tagout of Energy Sources”.

3.5.3 This instruction applies to installations where an AL/AS model air hoist is installed on an MAL/MAS trolley. In this case the hoist and trolley are controlled by a pendant with four push buttons – two for the hoist motion and two for the trolley motion. Special air hose considerations must be taken if the trolley is used with a hoist other than an AL/AS model.

3.5.4 Trolley to Hoist Connection – The Trolley Hoist Air Hose connects directly to the air fittings on the trolley and on the hoist. Make these connections as follows:

1) Refer to Figure 3-2 and Figure 3-3.

2) Small body assemblies have a built-in tee with a hose barb. Large body assemblies have a tee piped to trolley valve with a hose barb on one end. Insert the air hose over the hose barb supplied at the trolley until fully seated. Install HOSE CLAMP at trolley end and tighten to 55 in-lb.

3) Insert another hose clamp onto the hose, and connect the other end of the air hose over the hoist hose barb until fully seated. Tighten the other HOSE CLAMP at the hoist end to 55 in-lb.

3.5.5 **Small Body Pendant Connection (1/4-1 ton) –** Refer to Figure 3-2**.**

For hoist:

1) Fit the actuator assembly to the hoist by removing the two VALVE COVER SCREWS on the valve assembly. Also remove the SCREW on the side of the supply air port, and replace it with the push fitting provided.

2) Remove the cover from the actuator assembly and secure the actuator assembly with the same VALVE COVER SCREWS that previously secured the valve cover.

3) Fit the HOSE BIB underneath the actuator assembly. Attach the pendant hose to the HOSE BIB with the hose clamp provided.

4) Run the YELLOW TUBE, BLACK TUBE, and GRAY TUBE through the channel in the actuator assembly and attach each tube to the push fitting at the designated locations. Run the STRAIN RELIEF through the cutout and tie a knot.

5) Re-secure the actuator assembly cover.

6) **NOTICE** When attaching tubes take care not to bend or kink tubing. This will result in the air flow being restricted and poor response to the pendant controls.

For trolley:

1) Pull the HOSE ASSEMBLY with the protective outer jacket through the trolley support bracket. Install a HOSE CLAMP around the hose assembly above the trolley bracket.

2) Install SPRING onto trolley hose “B” and install hose into respective hose coupling.

3) Insert the other two trolley hoses (A and C) into their respective hose couplings.

4) Tie the STRAIN RELIEF rope to the EYE BOLT on the bracket.

5) Tighten HOSE CLAMP to 55 in-lb.

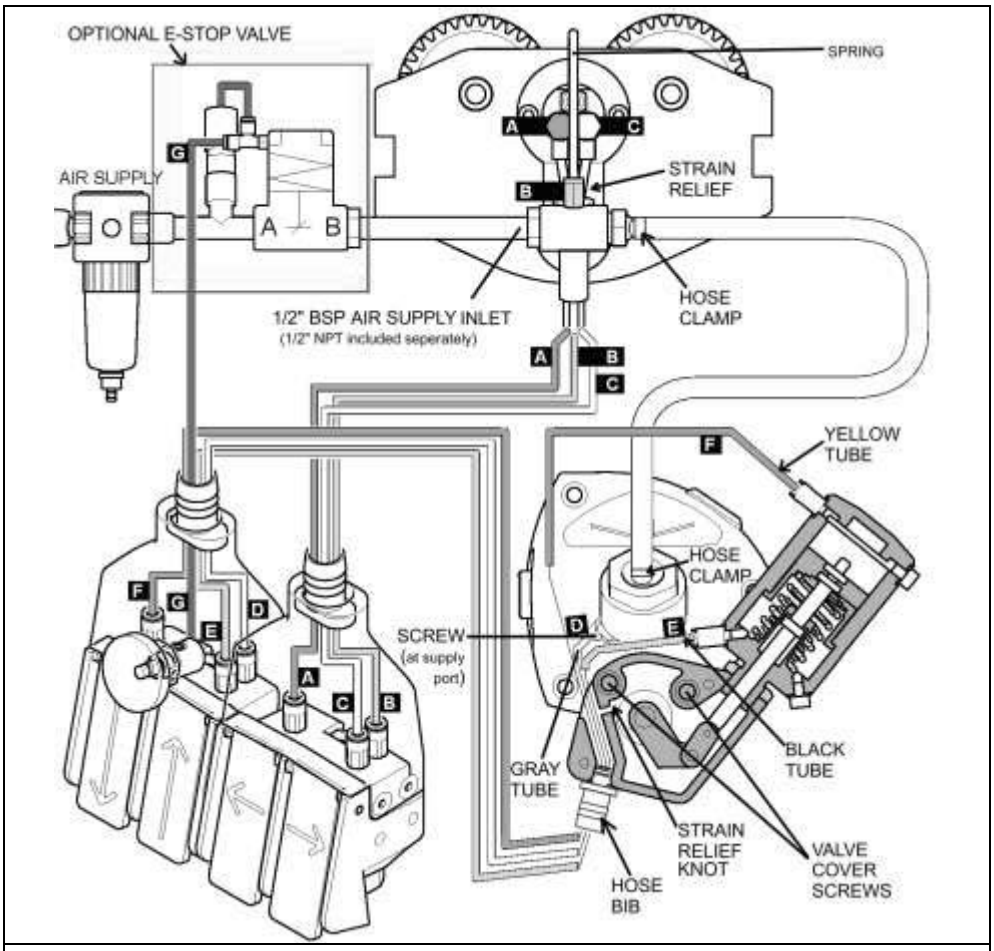


Figure 3-2 Small body air connection

3.5.6 **Large Body Pendant Connection (*2 - 5 ton*) –** Refer to Figure 3-3**.**

For hoist and trolley:

1) Remove the two VALVE COVER SCREWS and the valve cover on the trolley valve assembly. Also remove the SCREW at the air supply port, and replace it with the push fitting provided.

2) Remove the cover from the actuator assembly and secure the actuator assembly with the VALVE COVER SCREWS.

3) Fit the actuator assembly and connect the hosing by following the same steps for the Small Body Hoist Pendant Connection, steps 3-6.

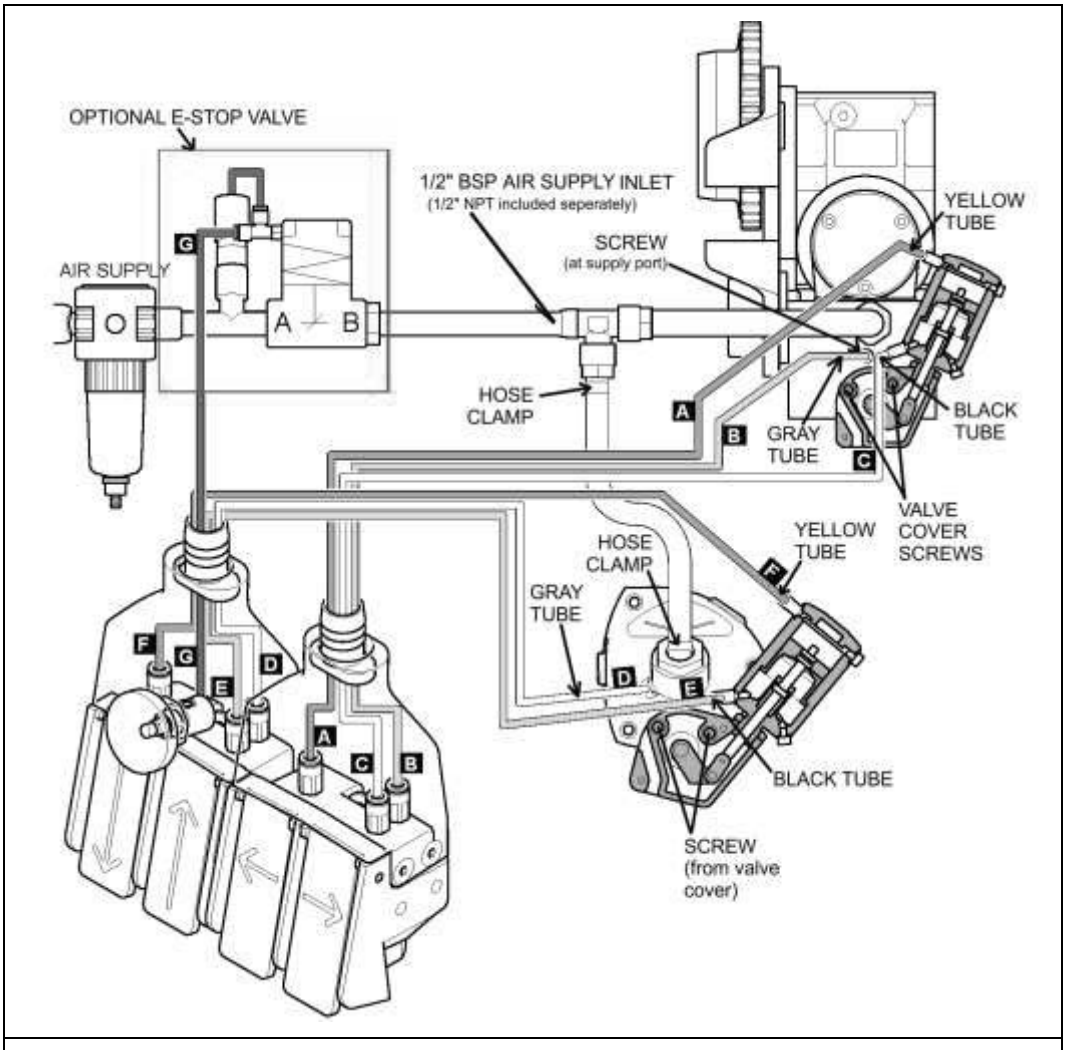


Figure 3-3 Large body air connection

3.5.7 **Optional E-stop Valve Installation (All capacities) -** refer to Figure 3-4**.**

1) Mount the ADAPTER on the inlet side of the bracket on the trolley.
2) Mount the VALVE at position B on the ADAPTER.
3) Mount the PUSH TEE FITTING at position 1 on the VALVE.
4) Mount the PIPE TEE on position A on VALVE.
5) Put together the REDUCER and the REGULATOR, then mount it on the PIPE TEE.
6) Use 4-12" (100-300 mm) of the HOSE to connect the REGULATOR and the PUSH TEE FITTING.
7) Mount the PUSH FITTING on the emergency button in the lower hole.
8) Block the upper hole with the Set SCREW and loctite 5208.
9) Thread the HOSE through the protecting hose down to the pendant control with the emergency button.
10) Connect the HOSE to the PUSH FITTING on the emergency button.
11) Connect the other end of the HOSE to the PUSH TEE FITTING.

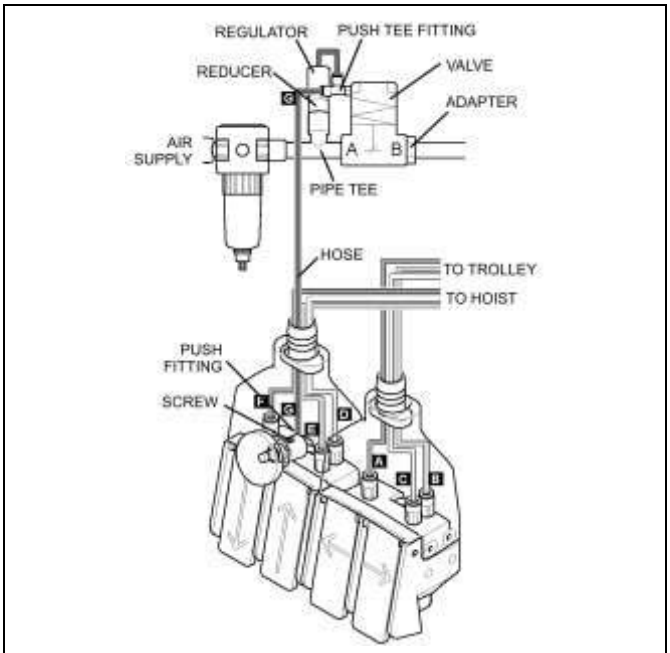


Figure 3-4 Optional Emergency Stop Installation

3.6 Air Supply System Requirements

3.6.1 **NOTICE** Pressure and Flow - Verify that the air supply system has capacity to supply your air trolley hoist with required pressure and flow. Otherwise the hoist may operate poorly or may fail to operate. See Section 3.7.

3.6.2 **⚠ CAUTION** Air Quality - Good air quality is essential to prevent damage to your trolley hoist and to ensure its proper operation. The air must be clean and free of debris such as dirt and rust. Refer to Section 3.9 for filtration requirements. The air must also be dry; free of moisture and water. Refer to Section 3.10.

3.6.3 The ALM/ASM are equipped with lube-free vane motors and do not require lubrication of the supply air for operation. However, if the trolley hoist air is lubricated, there is no disadvantage. For further information, see Section 3.8.

3.7 Air Supply Capacity and Regulation

3.7.1 Capacity - The air supply system must be capable of delivering the required airflow (cfm) to the trolley air supply inlet port. Without the required airflow the hoist will not operate properly or may not operate at all. See Section 2.0 for your trolley hoist air consumption requirements. In determining if your system is capable of supplying the required airflow, consider the following:

- Capacity of compressor(s) and tank
- Other air consuming equipment
- Flow restrictions such as pipes, hoses, valves and fittings

Inadequate capacity will cause a significant drop in pressure when the hoist or trolley is operated, and could cause poor performance or failure to operate.

3.7.2 Regulation - The trolley hoist requires a constant supply of air at a pressure of 90 psi to work properly. If the air supply is not regulated or is regulated at a pressure greater than 90 psi, then a regulator must be used. The regulator may be located anywhere upline of the lubricator in the air supply to the hoist.

3.8 Air Lubrication

3.8.1 AL/W hoists do not require supply air lubrication for safe operation; however if the hoist supply air is lubricated, there is no disadvantage.

3.8.2 If using lubrication, follow the guidelines below for the best results. The lubricator must be located as follows:

1) **Best location** - At the trolley inlet. In this case the lubricator can be either the mist type or drop type.

2) **Second best location** - No more than 15 feet away from the trolley hoist, at the same elevation or above the trolley inlet. In this case the mist type lubricator must be used.

3) **Third best location** - No more than 15 feet away below the trolley hoist. In this case the mist type lubricator must be used.

3.8.3 **⚠ CAUTION** If a lubricator is used, it must be set to deliver the equivalent of 6 to 10 drops of oil per minute (0.1 to 0.2 cc/minute). The hoist and trolley exhaust will emit a fine oil mist when properly lubricated.

3.9 Filtration

3.9.1 **⚠ CAUTION** The air entering the trolley inlet must not contain any particulate greater than 5 microns in size. Therefore, the hoist must have a 15 micron filter in its air supply. The filter must be upstream of the lubricator.

3.9.2 The filter servicing the trolley hoist can also service other hoists and air consuming equipment. In this case, the air filter must be in sized for the total air consumption of the equipment it is servicing.

3.9.3 It is recommended to use a filter with automatic draining capability, to prevent excessive moisture accumulation.

3.10 Air Dryer - ⚠ CAUTION To prevent corrosion and hoist malfunction, employ an air dryer in the air supply system to ensure that dry air is supplied to the trolley hoist. If there is moisture in the air supplied to the trolley hoist, this moisture will cause corrosion on internal hoist and trolley components during periods when the hoist and trolley are idle leading to hoist and trolley malfunction.

3.11 Piping, Hoses and Fittings

3.11.1 ⚠ CAUTION System Configuration - The system should be configured as shown in Figure 3-10. Since moisture tends to accumulate in compressed air systems, corrosion may result if the system is not periodically drained.

- Arrange for a drain in the air supply piping at the lowest point in the piping, and
- Periodically drain the system to remove moisture/water from the system and to prevent corrosion.
- Filter, regulator (if equipped), and lubricator must be arranged in the order shown in Figure 3-11.

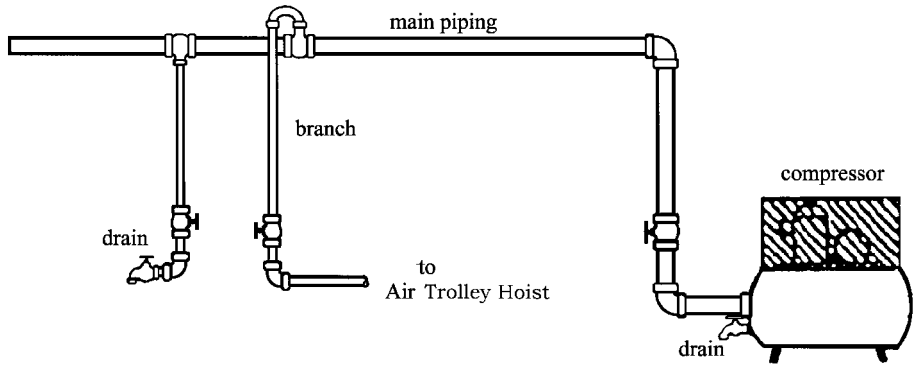


Figure 3-10 Diagram of Air Supply Configuration (Typical)

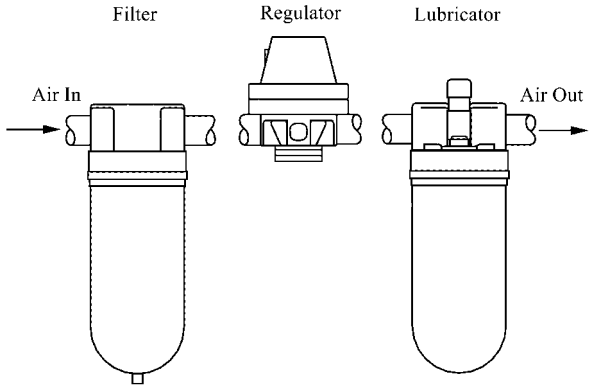


Figure 3-11 Typical Air Supply Filter, Regulator and Lubricator.

3.11.2 **NOTICE** Piping - Pipe should be sized to accommodate the trolley hoist airflow requirements. Table 3-3 gives recommended pipe sizes.

Table 3-3 Air Supply Pipe and Hose Sizes		
Model	**Diameter of Supply Pipe**	**Diameter of Supply Hose**
A(L/S)M003(W)P, A(L/S)M005(W)P, ALM010(W)P2	Inside diameter 0.75 inch or larger	Inside diameter 0.5 inch or larger
ALM020(W)P, ALM030(W)P, ALM050(W)P2	Inside diameter 1.0 inch or larger	Inside diameter 0.75 inch or larger

3.11.3 **NOTICE** Hoses - The connection from the air supply system piping to the trolley hoist must be made with a flexible pressure hose. Due to normal line losses in air supply lines:

- Do not use hose smaller than specified in Table 3-3, and
- Limit the length of the hose to that specified in Figure 3-12.

If your application exceeds these requirements consult factory.

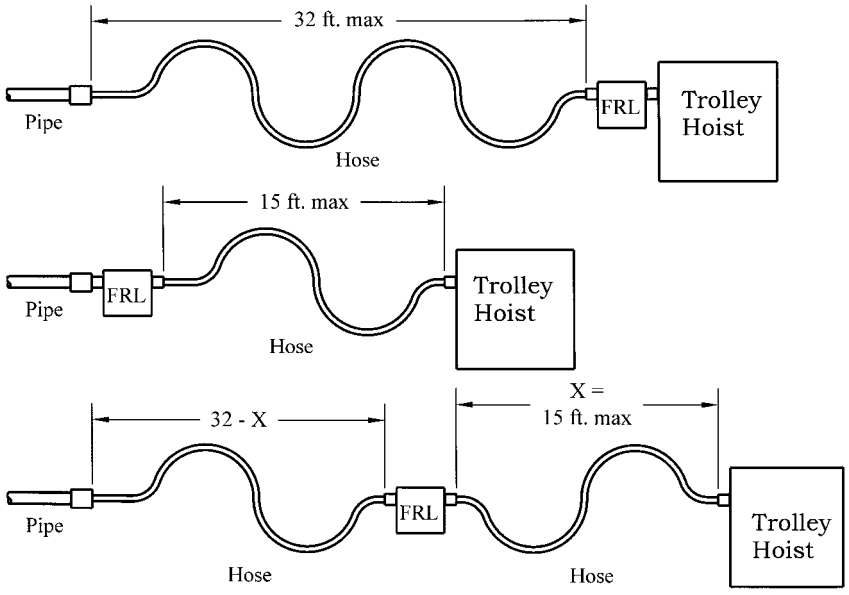


Figure 3-12 Typical Arrangements of Filter, Regulator and Lubricator and Maximum Air Supply Hose Lengths

3.11.4 **⚠ CAUTION** Fittings - Important considerations regarding fittings in the hoist and trolley's air supply include:

- When connecting air supply components, remove all dirt or debris from the connecting surfaces of the hoses, pipes, fittings, or threaded fasteners to prevent contaminants from entering the hoist and trolley.
- Keep airflow restrictions such as quick disconnect fittings, bends, elbows, and adapters to a minimum.

3.11.5 **⚠ CAUTION** Before connecting the trolley hoist to its air supply line, perform the proper draining and purging procedures to prevent contaminants or moisture from entering the hoist.

3.12 Connecting Trolley Hoist to Air Supply

3.12.1 **⚠WARNING HAZARDOUS AIR PRESSURE IS PRESENT IN THE HOIST AND TROLLEY, IN THE SUPPLY OF COMPRESSED AIR TO THE TROLLEY HOIST, AND IN THE CONNECTIONS BETWEEN COMPONENTS.**

3.12.2 Shut off the air supply and stop the airflow completely. Lock out and tag out in accordance with ANSI Z244.1 “Personnel Protection -Lockout/Tagout of Energy Sources”.

3.12.3 **⚠ CAUTION** Before connecting the air supply hose to the trolley , always purge the air hose to clear any debris and water.

3.12.4 Make connections to air supply; reference Figure 3-2 and 3-3. Main air inlet is supplied as ½” BSP, but ½” NPT inlet fitting is supplied with the unit.

3.12.5 **NOTICE** Where conditions dictate, the installation sequence can be reversed by connecting the air supply first, followed by mounting the trolley hoist.

3.13 Pre-operational Checks and Trial Operation

3.13.1 Refer to the trolley's nameplate and record the Code and Serial Number in the space provided on the cover of this manual.

3.13.2 Refer to the hoist's owner's manual and perform all pre-operational checks for the hoist.

3.13.3 Perform pre-operational checks for the trolley:

- **⚠WARNING** Confirm the adequacy of the rated capacity for all slings, chains, wire ropes and all other lifting attachments before use. Inspect all load suspension members for damage prior to use and replace or repair all damaged parts.
- Ensure that trolley is properly installed on the beam, and stops for the trolley are correctly positioned and securely installed on the beam.
- Ensure that all nuts, bolts and split pins (cotter pins) are sufficiently fastened.
- Pull down on the Pendant and ensure that the Strain Relief Cable takes the force, not the Pendant Assembly.
- **⚠ CAUTION** Check air supply before everyday use. If the air supply volume and pressure is not sufficient the hoist and trolley may not function normally.

3.13.4 Confirm proper operation.

- Before operating read and become familiar with Section 4 - Operation.
- Before operating ensure that the hoist (and trolley) meets the Inspection, Testing and Maintenance requirements of ANSI/ASME B30.16.
- Before operating ensure that nothing will interfere with the full range of the hoist’s (and trolley’s) operation.

3.13.5 Proceed with trial operation to confirm proper operation.

- Verify that the controls agree with hoist direction. Make sure that depressing the Up button lifts the load chain and depressing the Down button lowers the load chain hook. If the load chain does not move in the correct direction when the push buttons are pushed, the air tubes are connected incorrectly. In this case, turn off the air supply and correct the pendant tube attachment at the hoist. The hook will then move in accordance with the directions of the push button.
- Operate the trolley through its full range of motion. Make sure the trolley runs smoothly and does not bind.
- Perform inspections per Section 5.3, “Frequent Inspections”.

4.0 Operation

4.1 Introduction

⚠ DANGER

DO NOT WALK UNDER A SUSPENDED LOAD

⚠ WARNING

HOIST OPERATORS SHALL BE REQUIRED TO READ THE OPERATION SECTION OF THIS MANUAL, THE WARNINGS CONTAINED IN THIS MANUAL, INSTRUCTION AND WARNING LABELS ON THE HOIST OR LIFTING SYSTEM, AND THE OPERATION SECTIONS OF ANSI/ASME B30.16 and ANSI/ASME B30.10. THE OPERATOR SHALL ALSO BE REQUIRED TO BE FAMILIAR WITH THE HOIST AND HOIST CONTROLS BEFORE BEING AUTHORIZED TO OPERATE THE HOIST OR LIFTING SYSTEM.

HOIST OPERATORS SHOULD BE TRAINED IN PROPER RIGGING PROCEDURES FOR THE ATTACHMENT OF LOADS TO THE HOIST HOOK.

HOIST OPERATORS SHOULD BE TRAINED TO BE AWARE OF POTENTIAL MALFUNCTIONS OF THE EQUIPMENT THAT REQUIRE ADJUSTMENT OR REPAIR, AND TO BE INSTRUCTED TO STOP OPERATION IF SUCH MALFUNCTIONS OCCUR, AND TO IMMEDIATELY ADVISE THEIR SUPERVISOR SO CORRECTIVE ACTION CAN BE TAKEN.

HOIST OPERATORS SHOULD HAVE NORMAL DEPTH PERCEPTION, FIELD OF VISION, REACTION TIME, MANUAL DEXTERITY, AND COORDINATION.

HOIST OPERATORS SHOULD **NOT** HAVE A HISTORY OF OR BE PRONE TO SEIZURES, LOSS OF PHYSICAL CONTROL, PHYSICAL DEFECTS, OR EMOTIONAL INSTABILITY THAT COULD RESULT IN ACTIONS OF THE OPERATOR BEING A HAZARD TO THE OPERATOR OR TO OTHERS.

HOIST OPERATORS SHOULD **NOT** OPERATE A HOIST OR LIFTING SYSTEM WHEN UNDER THE INFLUENCE OF ALCOHOL, DRUGS, OR MEDICATION.

OVERHEAD HOISTS ARE INTENDED ONLY FOR VERTICAL LIFTING SERVICE OF FREELY SUSPENDED UNGUIDED LOADS. DO **NOT** USE HOIST FOR LOADS THAT ARE NOT LIFTED VERTICALLY, LOADS THAT ARE NOT FREELY SUSPENDED, OR LOADS THAT ARE GUIDED.

NOTICE

- Read ANSI/ASME B30.16 and ANSI/ASME B30.10.
- Read the hoist manufacturer's Operating and Maintenance Instructions.
- Read all labels attached to equipment.

The operation of an overhead hoist involves more than activating the hoist's controls. Per the ANSI/ASME B30 standards, the use of an overhead hoist is subject to certain hazards that cannot be mitigated by engineered features, but only by the exercise of intelligence, care, common sense, and experience in anticipating the effects and results of activating the hoist's controls. Use this guidance in conjunction with other warnings, cautions, and notices in this manual to govern the operation and use of your overhead hoist.

4.2 Shall's and Shall Not's for Operation

⚠ WARNING

Improper operation of a hoist can create a potentially hazardous situation which, if not avoided, could result in death or serious injury, and substantial property damage. To avoid such a potentially hazardous situation **THE OPERATOR SHALL:**

- **NOT** lift more than rated load for the hoist.
- **NOT** operate unless load is centered under hoist.
- **NOT** use damaged hoist or hoist that is not working properly.
- **NOT** use hoist with twisted, kinked, damaged, or worn chain.
- **NOT** use hoist if the bottom hook is capsized (see Hoist Manual).
- **NOT** use the hoist to lift, support, or transport people.
- **NOT** lift loads over people.
- **NOT** apply load unless load chain is properly seated in the load sheave (and idle sheave for hoist with two chain falls).
- **NOT** use the hoist in such a way that could result in shock or impact loads being applied to the hoist.
- **NOT** attempt to lengthen the load chain or repair damaged load chain.
- **NOT** operate hoist when it is restricted from forming a straight line from hook to hook in the direction of loading.
- **NOT** use load chain as a sling or wrap load chain around load.
- **NOT** apply the load to the tip of the hook or to the hook latch.
- **NOT** apply load if binding prevents equal loading on all load-supporting chains.
- **NOT** operate beyond the limits of the load chain travel.
- **NOT** operate hoist with missing/damaged chain springs, cushion rubbers, stoppers or striker plates.
- **NOT** leave load supported by the hoist unattended unless specific precautions have been taken.
- **NOT** allow the chain, or hook to be used as an electrical or welding ground.
- **NOT** allow the chain, or hook to be touched by a live welding electrode.
- **NOT** remove or obscure the warnings on the hoist.
- **NOT** operate a hoist on which the safety placards or decals are missing or illegible.
- Be familiar with operating controls, procedures, and warnings.
- Make sure the unit is securely attached to a suitable support before applying load.
- Make sure load slings or other approved single attachments are properly sized, rigged, and seated in the hook saddle.
- Take up slack carefully - make sure load is balanced and load-holding action is secure before continuing.
- Make sure all persons stay clear of the supported load.
- Protect the hoist's load chain from weld splatter or other damaging contaminants.
- Report Malfunctions or unusual performances (including unusual noises) of the hoist and remove the hoist from service until the malfunction or unusual performance is resolved.
- Make sure hoist limit switches function properly.
- Warn personnel before lifting or moving a load.
- Warn personnel of an approaching load.

⚠ CAUTION

Improper operation of a hoist can create a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or property damage. To avoid such a potentially hazardous situation **THE OPERATOR SHALL:**

- Maintain a firm footing or be otherwise secured when operating the hoist.
- Check brake function by tensioning the hoist prior to each lift operation.
- Use hook latches. Latches are to retain slings, chains, etc. under slack conditions only.
- Make sure the hook latches are closed and not supporting any parts of the load.
- Make sure the load is free to move and will clear all obstructions.
- Avoid swinging the load or hook.
- Make sure hook travel is in the same direction as shown on controls.
- Inspect the hoist regularly, replace damaged or worn parts, and keep appropriate records of maintenance.
- Use the hoist manufacturer's recommended parts when repairing the unit.
- Lubricate load chain per hoist manufacturer's recommendations.
- **NOT** use the hoist load limiting or warning device to measure load.
- **NOT** use limit switches as routine operating stops. They are emergency devices only.
- **NOT** allow your attention to be diverted from operating the hoist.
- **NOT** allow the hoist to be subjected to sharp contact with other hoists, structures, or objects through misuse.
- **NOT** adjust or repair the hoist unless qualified to perform such adjustments or repairs.

4.3 Trolley and Hoist Controls

4.3.1 Pendant Control - When using the pendant control depress the Up lever to raise the hoist's hook or the Down lever to lower the hoist's hook as shown in Figure 4-1. Depress the Left and Right levers to move the trolley horizontally. To stop motion release the levers.

4.3.2 **⚠ CAUTION** Make sure the air motor completely stops before reversing direction.

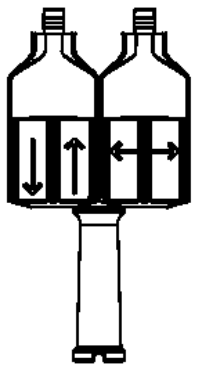


Figure 4-1 4 Lever Pendant Control

5.0 Inspection

5.1 General

5.12.1 The inspection procedure herein is based on ANSI/ASME B30.16. The following definitions are from ANSI/ASME B30.16 and pertain to the inspection procedure below.

- **Designated Person** - a person selected or assigned as being competent to perform the specific duties to which he/she is assigned.
- **Qualified Person** - a person who, by possession of a recognized degree or certificate of professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.
- **Normal Service** - that distributed service which involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65% of rated load for not more than 25% of the time.
- **Heavy Service** - that service which involves operation within the rated load limit which exceeds normal service.
- **Severe Service** - that service which involves normal or heavy service with abnormal operating conditions.

5.2 Inspection Classification

5.2.1 Initial Inspection - prior to initial use, all new, re-installed, altered, or modified trolleys shall be inspected by a designated person to ensure compliance with the applicable provisions of this manual.

5.2.2 Inspection Classification - the inspection procedure for trolleys in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the trolley and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as FREQUENT and PERIODIC, with respective intervals between inspections as defined below.

5.2.3 FREQUENT Inspection - visual examinations by the operator or other designated personnel with intervals per the following criteria:

- Normal service - monthly
- Heavy service - weekly to monthly
- Severe service - daily to weekly
- Special or infrequent service - as recommended by a qualified person before and after each occurrence.

5.2.4 PERIODIC Inspection - visual inspection by a designated person with intervals per the following criteria:

- Normal service - yearly
- Heavy service - semiannually
- Severe service – quarterly
- Special or infrequent service - as recommended by a qualified person before the first such occurrence and as directed by the qualified person for any subsequent occurrences.

5.3 Frequent Inspection

5.3.1 Inspections should be made on a FREQUENT basis in accordance with Table 5-1, "Frequent Inspection." Included in these FREQUENT Inspections are observations made during operation for any defects or damage that might appear between Periodic Inspections. Evaluation and resolution of the results of FREQUENT Inspections shall be made by a designated person such that the trolley is maintained in safe working condition.

Table 5-1 Frequent Inspection
All functional operating mechanisms for proper operation, proper adjustment, and unusual sounds.
Trolley braking system for proper operation
Hoist(s) in accordance with ANSI/ASME B30.16
Upper Limit Devices in accordance with ANSI/ASME B30.16
Hook(s) and hook latches in accordance with ANSI/ASME B30.10

5.4 Periodic Inspection

5.4.1 Inspections should be made on a PERIODIC basis in accordance with Table 5-2, "Periodic Inspection." Evaluation and resolution of the results of PERIODIC Inspections shall be made by a designated person such that the trolley is maintained in safe working condition.

5.4.2 For inspections where load suspension parts of the trolley are disassembled, a load test per ANSI/ASME B30.16 must be performed on the trolley after it is re-assembled and prior to its return to service.

Table 5-2 Periodic Inspection
Requirements of frequent inspection.
Loose or missing bolts, nuts, pins or rivets.
Worn, cracked, or distorted parts such as pins, bearings, wheels, shafts, gears, rollers, yokes, and bumpers.
Excessive wear of brake system parts
Deterioration of air components such as pendant and hose connections.
Proper function of motion limit devices that interrupt trolley hoist movement or cause a warning to be activated.
Function, instruction and warning labels for legibility and placement.

5.5 Occasionally Used Trolleys

5.5.1 Trolleys that are used infrequently shall be inspected as follows prior to placing in service:

- Trolley Idle More Than 1 Month, Less Than 1 Year: Inspect per FREQUENT Inspection criteria in Section 5.3.
- Trolley Idle More Than 1 Year: Inspect per PERIODIC Inspection criteria in Section 5.4

5.6 Inspection Records

5.6.1 Dated inspection reports and records should be maintained at time intervals corresponding to those that apply for the hoist's PERIODIC interval per Section 5.2.4. These records should be stored where they are available to personnel involved with the inspection, maintenance, or operation of the trolley.

5.7 Inspection Methods and Criteria

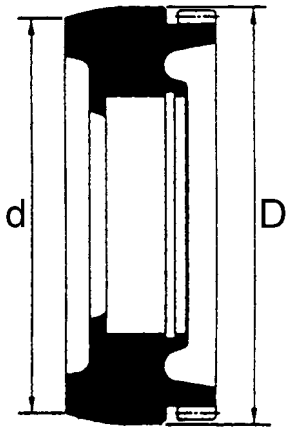
5.7.1 This section covers the inspection of specific items. The list of items in this section is based on those listed in ANSI/ASME B30.16 for Frequent and Periodic Inspection. In accordance with ANSI/ASME B30.16, these inspections are not intended to involve disassembly of the trolley. Rather, disassembly for further inspection would be required if frequent or periodic inspection results so indicate. Such disassembly and further inspection should only be performed by a qualified person trained in the disassembly and re-assembly of the trolley.

Table 5-3 Trolley Inspection Methods and Criteria

Item	Method	Criteria	Action
Functional operating mechanisms.	Visual, Auditory	Mechanisms should be properly adjusted and should not produce unusual sounds when operated.	Repair or replace as required.
Braking System Operation	Function	Trolley must come to a smooth stop within 10% of its traveling speed when the pendant button is released.	Repair or replace as required.
Housing and Mechanical Components	Visual, Auditory, Vibration, Function	Trolley components including, suspension shafts, track wheels, track wheel axles, clevises, connection yokes, suspension bolts, shafts, gears, bearings, pins, rollers, and bumpers should be free of cracks, distortion, significant wear and corrosion. Evidence of same can be detected visually or via detection of unusual sounds or vibration during operation.	Replace.
Side Plates	Visual	Must be free of significant deformation	Replace.
Bolts, Nuts, Snap Rings, and Split Pins	Visual, Check with Proper Tool	Bolts, nuts, snap rings and split pins should not be loose.	Tighten or replace as required.
Track Wheel - Tread	Visual, Measure	Diameter of the inside and outside tread surface should not be less than the discard value shown in **Table 5-4**.	Replace.
Track Wheel - Gear	Visual	Teeth should not be cracked, damaged, or excessively worn.	Replace.
Side Rollers - Wear	Visual, Measure	Diameter should not be less than the discard value shown in **Table 5-5**.	Replace.
Suspension Shaft	Visual, Measure	Suspension shaft should not be bent. Diameter should not be worn by 10% or more.	Replace.
Pendant – Tubing	Visual	Surface of tubing should be free from nicks, gouges, and abrasions. Tubing should not leak even when flexed back-and-forth. Tubing should not be deformed or loosely connected and free of significant deterioration.	Replace

Table 5-3 **Trolley Inspection Methods and Criteria**			
Item	**Method**	**Criteria**	**Action**
Pendant – Buttons	Function	Depressing and releasing push buttons should start or stop load chain or trolley movement.	Repair or replace as necessary.
Pendant – Assembly	Visual	Pendant Assembly – housing, bracket and conduit should be free of damage. Pendant Strain Relief Cable should absorb all of the load associated with forces applied to the pendant.	Replace.
Air Supply Hoses	Visual, Air Flow	Surface of hose should be free from nicks, gouges, and abrasions. Hose should not leak even when flexed back-and-forth. Hose should not be deformed or loosely connected and free of significant deterioration.	Replace.
Air Hose Fittings	Visual	All Fittings should not be cracked or damaged.	Repair or replace as necessary.
Pendant - Labels	Visual	Labels denoting functions should be legible.	Replace.
Warning Labels	Visual	Warning Labels should be affixed to the pendant cord (see **Section 1.2**) and they should be legible.	Replace.
Trolley Capacity Label	Visual	The label that indicates the capacity of the trolley should be legible and securely attached to the trolley.	Replace.

Table 5-4 Track Wheel Wear Dimensions



Note: Track wheels are for flat and tapered flanges.

Trolley Code	**"d" Dimension inch (mm)**		**"D" Dimension inch (mm)**	
	Standard	**Discard**	**Standard**	**Discard**
MA(L/S)003(W), 005(W), 010(W)	2.64 (67)	2.52 (64)	2.76 (70)	2.60 (66)
MAL020(W),030(W)	4.33 (110)	4.09 (104)	4.49 (114)	4.25 (108)
MAL050	5.28 (134)	5.0 (127)	5.51 (140)	1.30 (133)

6.0 Maintenance & Handling

6.1 Air Trolley Lubrication

6.1.1 MAL/MAS air trolleys do not require supply air lubrication. However, if the hoist supply air is lubricated, there is no disadvantage.

6.1.2 See Section 3.8 for lubrication requirements.

6.1.3 If one chooses to lubricate the air motor, oil will be provided primarily by the air supply lubricator. The recommended amount is 6-10 drops/minute (0.1 to 0.2 cc/min.). Refer to Table 6-1 below for the approved lubricant for use with your air hoist.

6.1.4 Additional lubrication to the reduction gears is typically not necessary. The large body gear box is filled with synthetic oil, and under normal operation it will not need to be changed. If for any reason additional oil is required use Table 6-1 below (the total oil quantity is approx 5oz./0.15L).

Table 6-1 Table of Approved Lubricants

	Part	
Brand	**Large Body Gear Box**	**Air Lubrication (Optional)**
Harrington		
Exxon		Arox EP46
Mobil	Glygoyle 22 (ISO VG150)	Almo Oil 525
Shell	Tivela Oil WB (ISO VG150)	Torcula 32
Texaco	Synlobe (SAE 90)	Aries 32
Molycote		

6.1.5 Lubricate the following trolley components with NLGI (National Lubricating Grease Institute) #2 or equivalent grease.

i. Track Wheel Gear – Clean and re-grease the Track Wheel gears and motor output pinion every three months (more frequently for heavier usage or severe conditions). Do not use an excessive amount of grease and avoid getting any grease on the running surfaces of the Track Wheels or the beam.

ii. Suspension Pins, Bolts and Shafts – Grease at least twice per year for normal usage (more frequently for heavier usage or severe conditions).

6.2 Storage

6.2.1 The storage location should be clean and dry.

6.2.2 Care should be take to not damage any of the air fittings.

6.2.3 When storing the trolley for long periods of time, apply approximately ½ ounce of lubrication into the air hose and operate the trolley for 3 – 4 seconds.

6.3 Outdoor Installation

6.3.1 For trolley and hoist installations that are outdoors, the trolley and hoist MUST be covered and protected from the weather when not in use.

6.3.2 Possibility of corrosion on components of the trolley increases for installations where salt air and high humidity are present. In order to prevent internal corrosion from occurring, the hoist must be operated using proper quality air at least once per week by moving the trolley a distance in each direction. For such situations you may need to operate your trolley more often than once per week.

6.3.3 The trolley may require more frequent lubrication.

6.3.4 Make frequent and regular inspections of the unit's condition and operation.

7.0 Troubleshooting

⚠ WARNING

HAZARDOUS AIR PRESSURE IS PRESENT IN THE HOIST, IN THE SUPPLY OF COMPRESSED AIR TO THE HOIST, AND IN THE CONNECTIONS BETWEEN COMPONENTS.

Before performing ANY maintenance on the equipment, de-energize the supply of compressed air to the equipment, and lock and tag the supply device in the de-energized position. Refer to ANSI Z244.1, "Personnel Protection - Lockout/Tagout of Energy Sources."

Only trained and competent personnel should inspect and repair this equipment.

Table 7-1 Troubleshooting Guide

Symptom	Cause	Remedy
Trolley will not operate	Loss of power	Check air tubes, hoses and air supply.
	Wrong air volume or pressure	Check air volume and pressure against the rating on the nameplate of the trolley.
	Improper, loose, or broken tubing or hoses in trolley air supply system	Shut off air supply, check tubing and hose connections at the hoist, trolley and push-button pendant.
Trolley Operates Intermittently	See Trolley will not operate	
Traveling speed is slow	Low air pressure at hoist inlet port.	Repair or adjust air supply or filters. Check for airline obstruction.
	Air supply hose or piping is too small.	Replace hose or piping sizes with recommended sizes in **Section 3.11.**
	Bending or crimping of pendant hoses or control tubes	Correct or repair the bend or crimp in hose and/or control tubes
	Lack of sufficient oil in air supply to trolley	Increase oil in air supply to trolley in accordance with requirements in **Section 6.1.**
	Exhaust Silencer clogged	Clean or replace.
	Air flow capacity of compressed air system insufficient	Increase airflow capacity of compressed air system to requirements in **Section 2.0.**
	Air motor vanes or bearings worn	Repair at service facility.
	Air supply to hoist contains dirt or debris	Filter the air supply to the trolley in accordance with the requirements in **Section 3.9.**

8.0 Warranty

All products sold by Harrington Hoists, Inc. are warranted to be free from defects in material and workmanship from date of shipment by Harrington for the following periods:

1 year – Electric and Air Powered Hoists (excluding (N)ER2 Enhanced Features Models), Powered Trolleys, Powered Tiger Track Jibs and Gantries, Crane Components, Sling Chain, Spare / Replacement Parts
2 years – Manual Hoists & Trolleys, Beam Clamps
3 years – (N)ER2 Enhanced Features Model Hoists
5 years – Manual Tiger Track Jibs and Gantries, TNER Pull - Rotor Motor Brake
10 years – (N)ER2 "The Guardian" Smart Brake

The product must be used in accordance with manufacturer's recommendations and must not have been subject to abuse, lack of maintenance, misuse, negligence, or unauthorized repairs or alterations.

Should any defect in material or workmanship occur during the above time period in any product, as determined by Harrington Hoist's inspection of the product, Harrington Hoists, Inc. agrees, at its discretion, either to replace (not including installation) or repair the part or product free of charge and deliver said item F.O.B. Harrington Hoists, Inc. place of business to customer.

Customer must obtain a Return Goods Authorization as directed by Harrington or Harrington's published repair center prior to shipping product for warranty evaluation. An explanation of the complaint must accompany the product. Product must be returned freight prepaid. Upon repair, the product will be covered for the remainder of the original warranty period. Replacement parts installed after the original warranty period will only be eligible for replacement (not including installation) for a period of one year from the installation date. If it is determined there is no defect, or that the defect resulted from causes not within the scope of Harrington's warranty, the customer will be responsible for the costs of returning the product.

Harrington Hoists, Inc. disclaims any and all other warranties of any kind expressed or implied as to the product's merchantability or fitness for a particular application. Harrington will not be liable for death, injuries to persons or property or for incidental, contingent, special or consequential damages, loss or expense arising in connection with the use or inability whatever, regardless of whether damage, loss or expense results from any act or failure to act by Harrington, whether negligent or willful, or from any other reason.

9.0 Parts List

When ordering Parts, please provide the trolley's code number and serial number located on the trolley's nameplate (see figure 9-1 below).

Reminder: Per sections 1.1 and 3.12.1 to aid in ordering Parts and Product Support, record the Trolley's code number and serial number in the space provided on the cover of this manual.

Figure 9-1 MAL Nameplate

The parts list is arranged into the following sections:

M(AL/AS)003(W), M(AL/AS)005(W), MAL010(W), MAL020(W), MAL030(W), MAL050

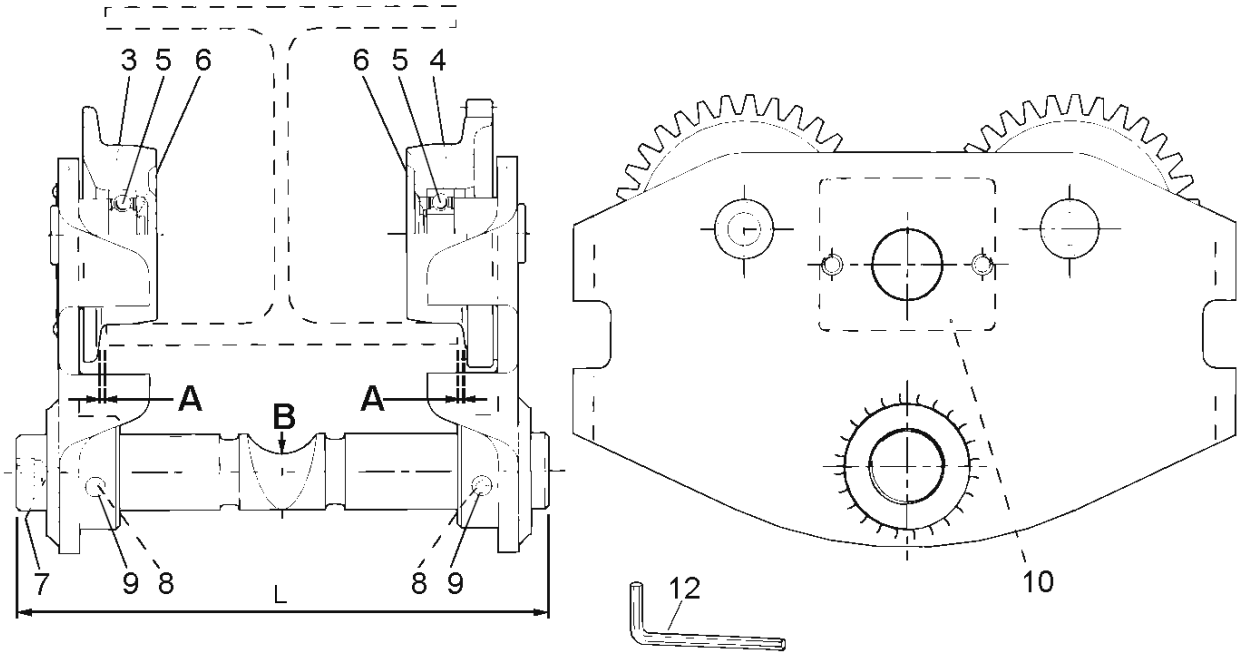


Figure 9-1 Trolley Body

Fig. No.	Description	Qty.		M(AL/AS) 003(W)	M(AL/AS) 005(W)	MAL 010(W)	MAL 020(W)	MAL 030(W)	MAL 050
3	Track Wheel "G" Assembly	MAL	2	AL4380066700					
		MAS	4	AS4380066701*					
4	Track Wheel "S" Assembly	MAL	2	AL4380066400					
5	Bearing	4		9000602			9000606		
6	Retaining Ring	4		9047115			9047115		
7	Shaft[1]	MAL	1	AL4380064001			AL4380060800		AL4380070600
		MAS		AS4380064011*					
8	Rubber plug	4		AL4380066300			AL4380060900		
9	Lock screw	4		AL0196131900			AL0196132000		
10	Name plate	4		80597	80598	80599	80600	80601	80602
12	Hexagon wrench (4mm)	1		AL0902011200					

*Included in AS conversion kit AL4320255580

1 - Shaft is the same for standard and wide versions. Wide version trolleys have different side plates

9.2 Drive Unit Connection

M(AL/AS)003(W), M(AL/AS)005(W), MAL010(W)

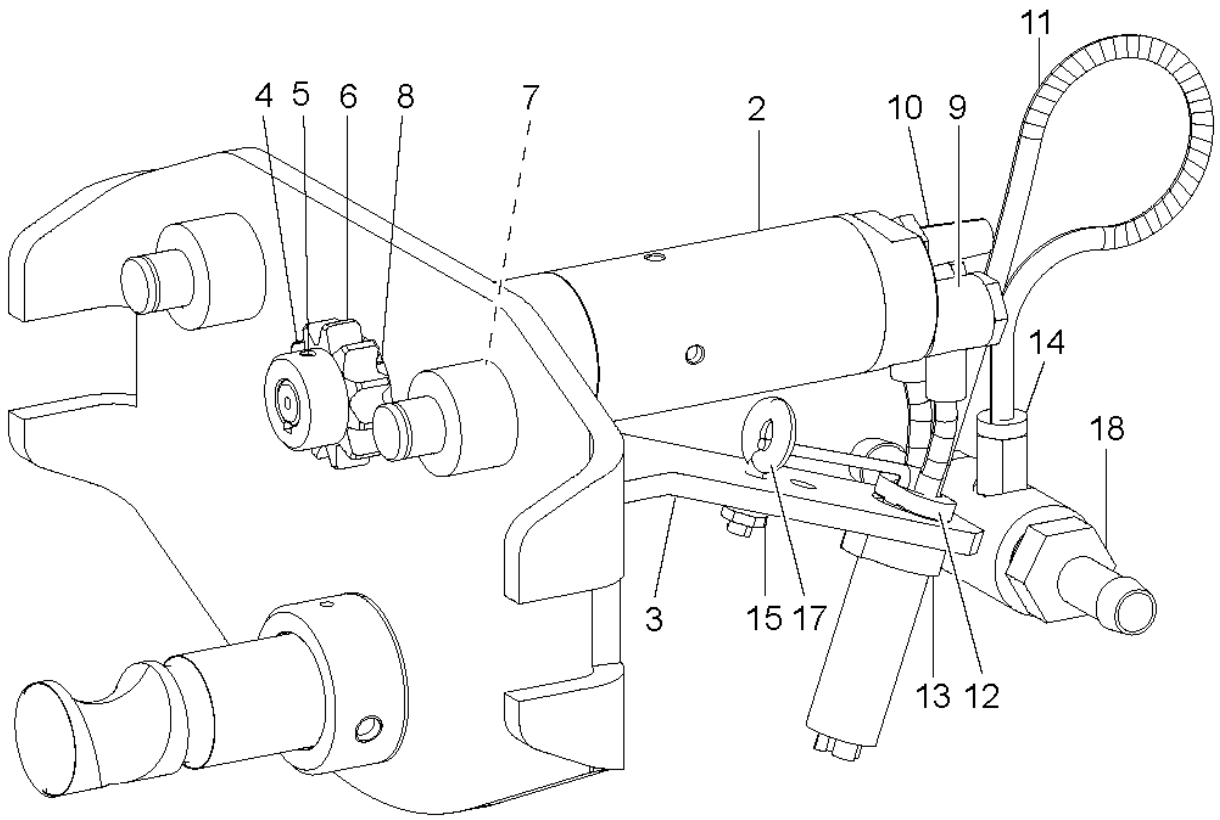


Figure 9-2 Small Body Drive Unit Connection

9.2 Drive Unit Connection

Fig. No.	Description	Qty.	M(AL/AS)003(W)	M(AL/AS)005(W)	MAL010(W)
2	Drive unit, complete	1	AL8411033239		
3	Mounting bracket	1	AL4380067200		
4	Screw M8x20 SHCS	4	9091272		
5	Set screw M5x6	1	AL0192120200		
6	Gear wheel	2	AL4380066800		
7	Screw M8x20 SHCS	2	9091272		
8	Washer A 8.05	1	AL0333212500		
9	Banjo coupling	2	AL9090158700		
10	Silencer G 1/4”	2	AL9090050800		
11	Spring	2	AL4310088200		
12	Adapter	2	AL4310231100		
13	Hose clamp	2	9013170		
14	Coupling G 1/8”-6 mm	2	AL0583810057		
15	Nut, M6	1	9093420		
17	Eye bolt M6x20 FZB	1	AL0226992012		
18	Hose nipple	2	AL9000024300		

9.2 Drive Unit Connection

MAL020(W), MAL030(W), MAL050

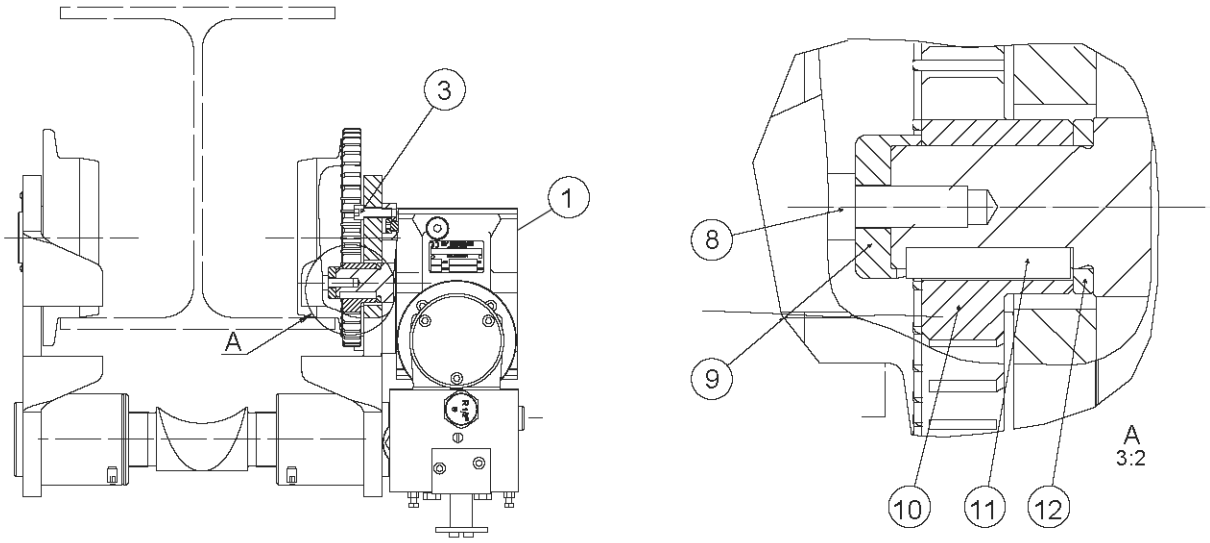


Fig 9-3 Large Body Drive Unit Connection

Fig. No.	Description	Qty.	MAL020(W)	MAL030(W)	MAL050
1	Drive unit	1	AL4380057880		
3	Screw (M8x30, SHCS)	3	9091274		
8	Screw (M8x25, SHCS)	1	9091273		
9	Bushing	1	AL4380070700		
10	Pinion	1	AL4380068500		
11	Key	1	AL4380068700		
12	Spacer	1	AL4380070500		

M(AL/AS)003(W), M(AL/AS)005(W), MAL010(W)

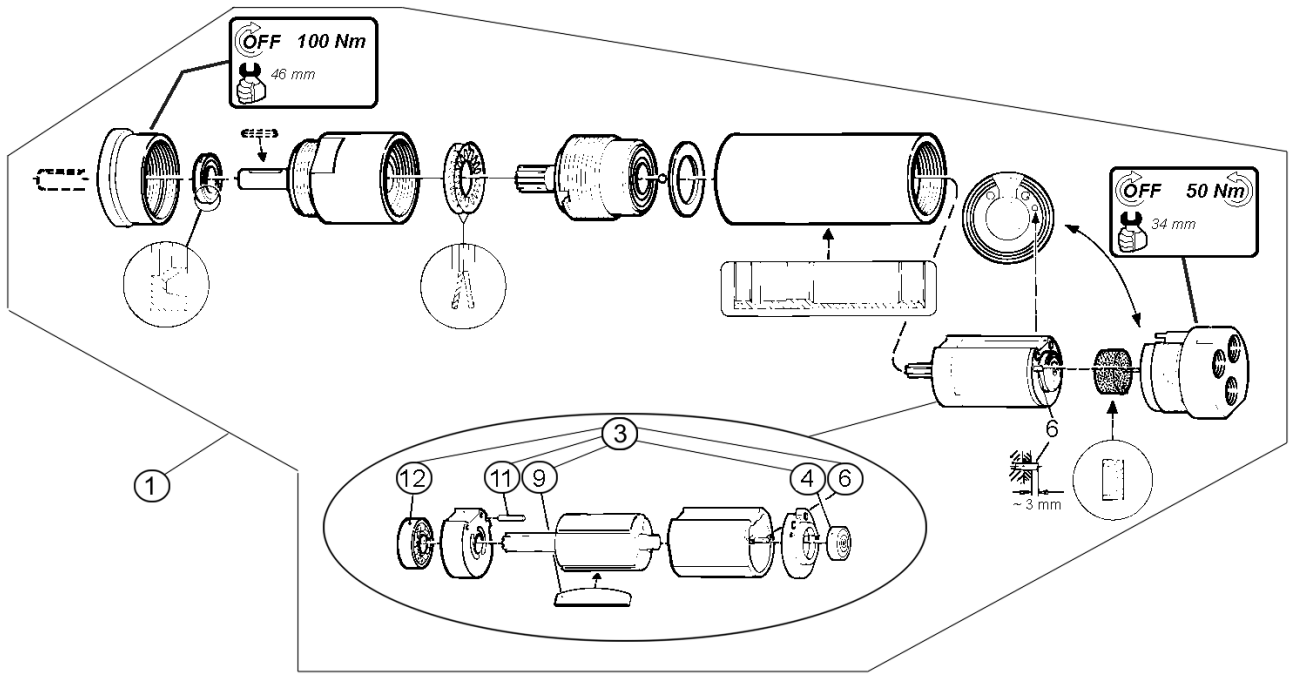


Figure 9-4 Small Body Drive Unit-Parts

Fig. No.	Description	Qty.	M(AL/AS)003(W)	M(AL/AS)005(W)	MAL010(W)
1	Drive Unit Complete		AL8411033239		
3	Trolley Motor Service Kit		AL4081004090		
4	Ball bearing				
6	Pin				
9	Vane				
11	Key				
12	Ball bearing				

9.3 Drive Unit Parts

MAL020(W), MAL030(W), MAL050

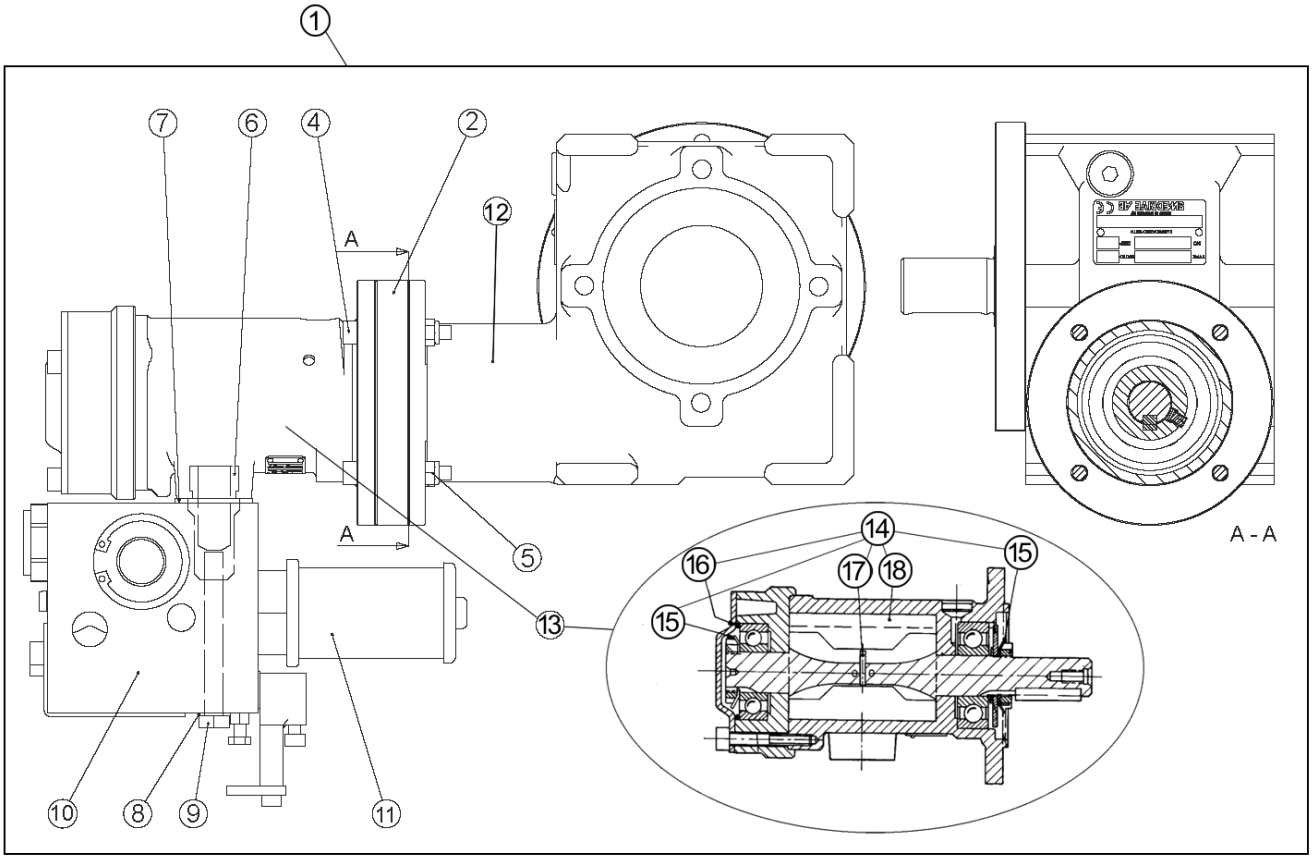


Fig 9-5 Large Body Drive Unit

Fig. No.	Description	Qty.	MAL020(W)	MAL030(W)	MAL050
1	Drive Unit Complete	1	AL4380057880		
2	Ring	1	AL4380058000		
4	Screw (M6x40, SHCS)	4	9091254		
5	Lock nut (M6)	4	9098504		
6	Nipple	2	AL4380058200		
7	Packing (25x33x2)	2	AL4380063400		
8	Packing (8.5x14x1)	2	AL0653103300		
9	Screw (M8x70, SHCS)	2	9093337		
10	Valve, compl.	1	AL4380058380		
11	Silencer	1	AL1020315600		
12	Worm gear	1	AL4380057860		
13	Air motor	1	AL8411100509		
14	Trolley Motor Service Kit	1	AL4430028290		
15	Lock washer	2			
16	O-ring	1			
17	Pin	3			
18	Vane	6			

9.4 Valve Unit Parts

MAL020(W), MAL030(W), MAL050

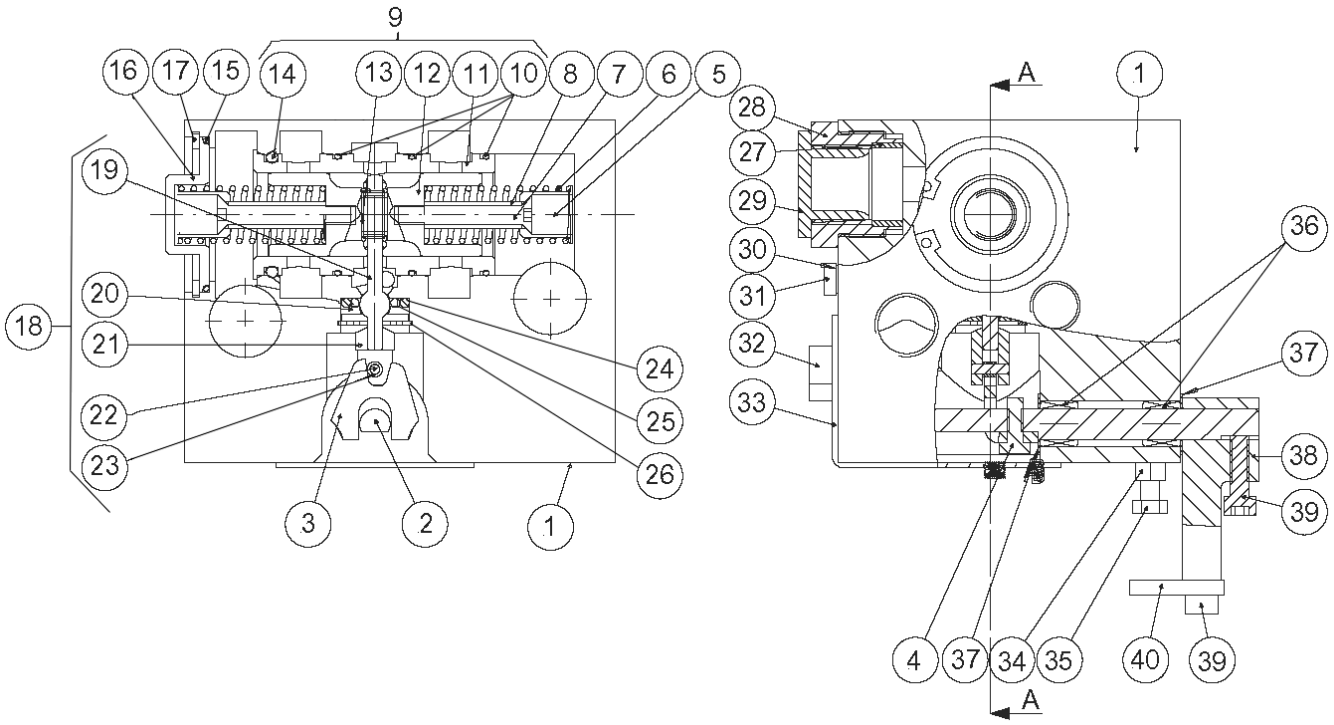


Figure 9-6 Valve Unit Parts

Fig. No.	Description	Qty.	MAL020(W)	MAL030(W)	MAL050
1	Valve housing	1	AL4380058380		
2	Shaft	1	AL4380058400		
3	Bend	1	AL4310072700		
4	Screw (M4x12, HHCS)	1	AL0147117103		
5	Sleeve	2	AL4310072000		
6	Spring	2	AL4380063500		
7	Screw (F6S 5x35)	2	AL0216121200		
8	Spacer	2	AL4310071900		
9	Valve, Complete	1	AL4320071482		
10	O-ring (27.1x1.6)	3	AL0663612900		
11	Liner	1	AL4310071401		
12	Cone	1	AL4310071501		
13	Spring	1	AL4310071600		
14	O-ring (26.2x3)	1	AL0663212800		
15	O-ring (37.1x1.6)	1	AL0663613300		
16	Cover	1	AL4310072500		
17	Snap ring	1	AL0335214000		
18	Lever, Complete	1	AL4320072180		
19	Lever	1			
20	Seat	1			
21	Yoke	1			
22	Pin	1			
23	Sleeve	1			
24	O-ring (15.1x1.6)	1	AL0663612200		
25	O-ring (8.3x2.4)	1	AL0663211500		
26	Snap ring	1	AL0335212000		
27	Strainer	1	AL4170047900		
28	Adapter	1	AL4170048200		
29	Plug	1	AL4150047200		
30	Packing	1	AL4010003300		
31	Screw (M5x6, SHCS)	1	9091223		
32	Screw (M6x12, SHCS)	2	9091247		
33	Cover	1	AL4380058500		
34	Nut	2	AL0266210700		
35	Screw (M5x20, SHCS)	2	9091229		
36	Bearing	2	AL0516401300		
37	Washer	2	AL4310072600		
38	Holder	1	AL4310208800		
39	Screw (M5x16, SHCS)	3	9091228		
40	Yoke	1	AL4380058600		

9.5 Pendant & Actuator Assemblies

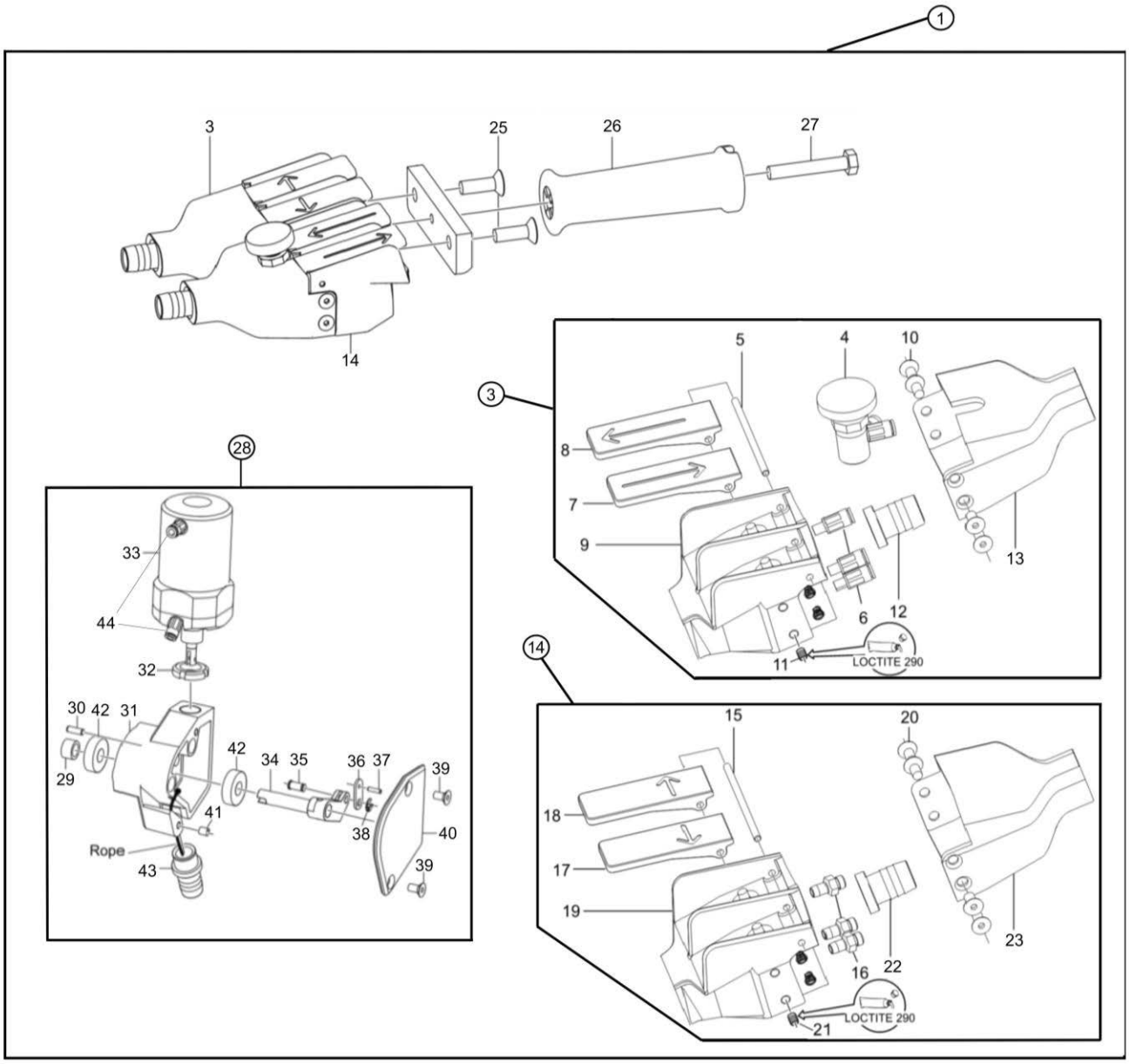


Fig 9–7 Pendant & Actuator Assemblies

Fig. No.	Description	Qty.*		M(AL/AS) 003	M(AL/AS) 005	MAL 010	MAL 020	MAL 030	MAL 050
1	4 BTN Pendant & Actuator Assembly (with hoses)	Std	1	7067701[1]			7067801[2]		
		E-stop		7067703[3, 5]			7067804[4, 5]		
	4 BTN Pendant & Actuator Assembly (no hoses)	Std		AL4310230390			AL4310230490		
		E-stop		AL4310226390[5]			AL4310226490[5]		
3	Valve Housing Assembly (Hoist)	Std	1	AL4310228664					
		E-stop		AL4310228660					
4	Optional emergency stop button	E-stop	2	AL4310231100					
5	Pin	1		AL4310051100					
6	Hose push fitting	3		AL0583810009					
7	Key, up	1		AL4310050501					
8	Key, down	1		AL4310050502					
10	Screw, MF6S M5x10	4		AL0216110004					
11	Screw, M5x6 45H	1		AL0190122100					
12	Adapter	1		AL4310231100					
14	Valve Housing Assembly (Trolley)	1		AL4310228661			AL4310228662		
15	Pin	1		AL4310051100					
16	Hose barb	3		AL4010003400					
	Hose push fitting	3					AL0583810009		
17	Key, right arrow	1		AL4310107800					
18	Key, left arrow	1		AL4310107900					
19	Housing	1		AL4310228691					
20	Screw, MF6S M5x10	4		AL0216110004					
21	Screw, M5x6 45H	1		AL0190122100					
22	Adapter	1		AL4310231100					
25	Screw, hex MF6S M8x25	2		AL0216132500					
26	Support handle	1		AL4110135500					
27	Screw, M8x50	1		9093333					
28	Actuator assembly (Hoist)	1		AL4320081490			AL4320081497		
	Actuator assembly (Trolley)	(1)					AL4320081490		
29	Bushing	1 (2)		AL4310077700					
30	Pin	1 (2)		AL0101123900					
31	Cylinder mount	1 (2)		AL4310081400					
32	Nut	1 (2)		AL0295310300					
33	Cylinder, compl.	1 (2)		AL4310082684					
34	Linkage, compl.	1 (2)		AL4310084580					
35	Pin	1 (2)		AL4310082700					
36	Link	1 (2)		AL4310082500					
37	Pin	1 (2)		AL0101117700					
38	Circlip	1 (2)		AL0335310600					
39	Screw	2 (4)		AL0216110004					
40	Cover	1 (2)		AL4310081300					
41	Screw	1 (2)		AL0190122100					
42	Ball bearing	2 (4)		AL0502109107					
43	Adapter	1 (2)		AL4310230500					
44	Hose push fitting	2 (4)		AL0583810009					

*Qty in ( ) is for large body hoists
1 – Includes hose kit # AL4310231094
2 – Includes hose kit # AL4310231093
3 – Includes hose kit # AL4310231096
4 – Includes hose kit # AL4310231095
5 – Includes emergency valve kit (installed between main air and trolley motor) - #8313203

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