

# Product Safety Information



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## Safe Operating Practices Manual

for

### Stationary Piston Air Motors



**Save These Instructions**



Form MHD56312

Edition 1

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Only allow **Ingersoll Rand** trained Technicians to perform maintenance on these motors. For additional information contact **Ingersoll Rand** or nearest Distributor.

The use of other than genuine **Ingersoll Rand** parts may result in a safety hazards, decreased performance, increased maintenance and may invalidate all warranties. The original language of this manual is English.

Manuals can be downloaded from [www.winchandhoistsolutions.com](http://www.winchandhoistsolutions.com)

Refer all communications to the nearest **Ingersoll Rand** Office or Distributor.

## SAFETY INFORMATION



### WARNING

• Failure to follow these warnings may result in death or severe injury.

### ■ General

- **Do not operate before reading manual(s) supplied with this motor**
  - Read all documentation supplied with the motor.
  - Contact factory if in doubt about installation, operation, inspection and maintenance instructions.
  - Do not discard manuals. Keep manuals readily available for all personnel.
- **Always install, operate, inspect and maintain this product in accordance with all applicable standards and regulations (local, state, country, federal, etc.)**

### ■ Motor Installation

- **Ensure motor is correctly installed**
  - Never weld on any part of the motor.
  - All supporting structures, mounting brackets and attaching hardware must be in accordance with all applicable standards, codes and regulations.
  - When moving the motor ensure that proper lifting equipment is used and do not lift motor over personnel.
  - Power supplied to the motor must meet **Ingersoll Rand** specifications for the motor. All connections must be tight and installation made with hoses and fittings that are new or in good condition and rated for the power supplied.
  - Use in a well ventilated area.
  - Use a muffler to reduce noise level to acceptable limits. Pipe away the exhaust where possible to prevent oil mist creating a slippery environment.
  - Installation personnel should be trained and knowledgeable in motor installation.
- **Do not remove or obscure any warning label or tag**
  - Ensure warning label(s) or tag(s) are visible to the personnel in the area.
  - If warning label(s) or tag(s) are damaged, illegible or become lost, contact your nearest distributor or the factory for free replacement.
- **Use only approved installation methods**
  - Do not make unauthorized modifications.
  - Alterations are not permitted to the motor without factory approval.
- **Use guards to avoid possible hazards**
  - Install guards to prevent personnel from contacting any moving parts.
- **Ensure an accessible shut off valve has been installed in the air supply line and make others aware of its location**
  - Always install an emergency shut off valve and instruct all personnel in its location and purpose.

### ■ Before Operating motor

- **Inspect motor prior to every shift**
  - These inspections are to identify equipment problems that must be repaired prior to motor use.
  - Perform all steps in "Frequent Inspection" procedure described in "Product Information" manual supplied with the motor.
  - Additionally perform "Periodic Inspection" procedure described in "Product Maintenance Information" manual at recommended frequency based on use conditions.
- **Ensure all motor components and attachments are functioning and properly adjusted**
  - Run motor slowly in each direction with no load and check operation of each attachment or option prior to application use.
- **Ensure motor mounting fasteners and supporting structure are secure and in good condition**
  - **Fasteners** - Check retainer rings, split pins, capscrews, nuts and other fasteners on motor, including mounting bolts. Replace if missing or damaged and tighten if loose.
  - **Foundation or supporting structure** - Check for distortion, wear, rigidity and continued ability to support motor at rated capacity. Ensure motor is firmly mounted and that fasteners are in good condition and tight.
- **Ensure motor hoses are in good condition and connections are tight**
  - Failure of air hoses or their disconnection while pressurized can result in hazardous situations including the whipping of hoses.
  - Keep clear of whipping hoses. Shut off the compressed air before approaching the whipping hose.
- **Do not operate if malfunctioning or damage is found**

- Notify supervisory or maintenance personnel of any malfunction or damage.
- **Ingersoll Rand** trained technicians must determine if repairs are required prior to operating the motor.
- Motor should never be operated with damaged controls or guards.
- **Use caution when operating in extremely cold temperatures**
  - Extremely cold temperatures can affect the performance of some materials. Operate motor with no load to lubricate parts prior to applying a load.
  - Ensure lubricants are suitable for operating temperatures.

### ■ When Operating Motor

- **Keep hands, clothing, jewelry, etc. away from moving parts**
  - All moving parts create entanglement, pinching and other hazards.
  - Use proper guards to ensure personnel are protected from moving parts.
  - Shut off motor and power to the motor before touching any moving part or entering any hazardous area.
- **Monitor motor operation at all times to avoid hazardous situations**
  - Monitor surrounding conditions that may create hazardous situations.
  - Continually monitor motor performance through all phases of operation.
- **Do not exceed motor ratings**
  - Refer to "SPECIFICATIONS" section in motor "Product Information" manual for maximum motor load rating.
  - Check motor data (name) plate for maximum motor HP.
- **Immediately stop operation if motor does not respond to control**
  - Check direction indicators on control match output shaft direction.
  - Ensure all controls function smoothly and do not stick or bind when operated.
  - Keep controls dry and clean to avoid hand slippage resulting in loss of motor control.
  - Test control functions when initially operating motor.
- **Wear hearing and eye protection**
  - Always wear approved protective clothing and equipment when operating the motor.
  - Ensure protective clothing and equipment is maintained in good condition.
- **Use only in a well ventilated area**
- **Keep clear of motor exhaust**
  - Use mufflers to reduce exhaust noise.
  - Exhaust air is discharged with force which can cause injury.
- **Always shut off air supply before servicing or leaving motor unattended**
  - Turn off, lock out power supply and activate control(s) several times to completely de-energize system.

### ■ Warning Symbol Identification



(A) Safety Alert Warning



(B) Read Manuals Before Operating Product



(C) Pinching, Crushing Hazard



(D) Wear Eye Protection



(E) Wear Hearing Protection

(Dwg. MHP2599)

A. Safety Alert Warning; B. Read Manual Before Operating Product; C. Pinching, Crushing Hazard; D. Wear Eye Protection; E. Wear Hearing Protection.

# INTRODUCTION

Ingersoll Rand provides this manual to inform installers, operators, maintenance personnel, supervisors and management of safe practices that must be followed. Motor operation involves more than operating the controls of the motor. Therefore, it is important for the motor operator to be instructed in the correct operation of motors and the severe consequences that may result from careless use.

It is not intended that the recommendations in this manual take precedence over existing plant safety rules and regulations or OSHA regulations. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence. A thorough study of the information in this manual should provide a better understanding of safe operating procedures and afford a greater margin of safety for people and equipment.

## WARNING

- **Failure to read and comply with any of the limitations noted in this manual and Ingersoll Rand Operation manuals can result in death or severe injury.**

**When following specific rules always:  
"USE COMMON SENSE"**

Even if you feel you are familiar with this or similar equipment, you should read this manual and appropriate motor Operation manuals before operating the motor.

## NOTICE

- **It is a responsibility of the owner/user to install, operate, inspect and maintain motor in accordance with all applicable Standards and Regulations. It is also the responsibility of the owner/user to comply with all applicable standards that address other types of equipment to which the motor may be mounted.**

Only those Authorized and Qualified Personnel who have read and demonstrated comprehension of this manual and any other supporting documentation, and that are knowledgeable in the proper operation and use of the motor should be permitted to operate the motor.

## ■ Alert Signals

Throughout this manual there are steps and procedures which, if not followed, may result in a hazard. The following signal words are used to identify the level of potential hazard.

## DANGER

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

## WARNING

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

## CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

## NOTICE

Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

The words **shall** and **should** are used throughout this manual in accordance with definitions in the ASME B30 standards as follows:

**Shall** - this word indicates that the requirement is mandatory and must be followed.

**Should** - this word indicates that the requirement is a recommendation. The advisability of the recommendation depends on the facts in each situation.

Also used in this manual and other manuals are the following words with definitions: **Owners/users** - these words also refer to motor operators.

**Operation Manuals** - documentation that is provided with the motor that contains installation, parts information, maintenance, lubrication and related service instructions.

## ■ Training Programs

It is a responsibility of the motor owner/user to make personnel aware of all federal, state and local rules, codes and company safety rules, regulations and instructions and to establish programs to:

1. Train and designate motor operators.
2. Train and designate motor inspection and maintenance personnel.
3. Ensure safety procedures are followed.
4. Ensure all accidents or safety violations are properly reported, and appropriate corrective action is taken prior to further equipment use.
5. Ensure that all motor warning tags, labels and the Operation manuals supplied with the motor are read.

### Applications in the USA

It is recommended that applicable US National Safety Council (NSC) and US Occupational Safety and Health Act (OSHA) standards be reviewed along with other recognized safety sources to provide safe motor installation and operation.

### Applications outside the USA

Follow all country or regional specific rules, regulations and standards that apply to operator/user training.

# WARNING TAGS AND LABELS

READ and OBEY all Danger, Warning, Caution, and Operating Instructions on the motor and in all Ingersoll Rand product manuals.

Check that all labels, tags and data (name) plates are in place and legible. Failure to comply with safety precautions described in the manuals supplied with the motor,

this manual or any of the labels and tags attached to the motor is a safety violation that may result in serious injury, death, or property damage.

If labels, tags and data (name) plate are illegible, contact your nearest distributor or the factory for replacements.

# MOTOR GENERAL INFORMATION

Ingersoll Rand motors are intended to be integrated or incorporated into a larger machine. The larger, completed machine, including all component parts, should meet all safety requirements for application, installation, operation, inspection and maintenance in accordance with all applicable standards and regulations (local, state, country, federal, etc.).

## WARNING

- **It is the responsibility of the owner/user to require that all personnel that will install, inspect, test, maintain, and operate the motor read the contents of this manual and the Operation Manuals furnished by Ingersoll Rand and become thoroughly familiar with the location and operation of the controls and features.**

## ■ Motor Controls

The location of controls and features can vary and depends on application requirements. Be familiar with location of controls and features.

Users and operators should not assume that all motors operate the same. Although there are many similarities, every motor should be reviewed for different

characteristics. Each motor has specific characteristics that the operator must understand and be familiar with.

Motors are operated by applying an air supply to the motor, which is connected through a drive train to the machine output. The direction of machine output rotation and speed is managed by the control.

Controls supplied with the motor are spring return to neutral when released. Various controls are available with the motors and are dependent on location to motor and degree of control required.

Motors normally use full flow control valves which are connected directly to the motor. The control valve has a lever, which is actuated forward and back for direction control. The degree of lever movement controls output shaft speed.

Pendant controls send a signal back to a valve or control panel mounted to the motor. This type of control allows the owner/user to be some distance from the motor. Pendant controls have levers or buttons which control clockwise and counterclockwise output shaft rotation.

The use of pendant controls require additional safety considerations, as the owner/operator may not be at the motor to observe output shaft rotation or operation of attached equipment.

## INSTALLATION

Inspect shipping package for any signs of shipping damage. Remove shipping material carefully and inspect motor for any damage. Pay close attention to hoses, fittings, brackets, handles, valves, or any other items that attach or protrude from motor.

Any item that appears damaged no matter how slight shall be inspected and a determination made as to its suitability for use prior to motor being placed into service.

Ensure that Warning and Operation labels and tags are not removed or covered during or after the installation process. Contact the factory for replacement labels if labels become damaged or unreadable.

Ensure that data (name) plate is attached and readable. Refer to the Product Information Manuals for additional information. Replacement data (name) plates are available when complete motor serial number is provided.

If winches are repainted, ensure labels and tags are protected and the protection is removed after painting.

### Applications in the USA

It is recommended that applicable US National Safety Council (NSC) and US Occupational Safety and Health Act (OSHA) standards be reviewed along with other recognized safety sources to provide safe motor installation and operation.

#### CAUTION

• **Owners and users are advised to examine specific, local or other regulations, including American Society of Mechanical Engineers and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting motor to use.**

It is the owner's and user's responsibility to determine the suitability of a product for any particular use. Review all applicable industry, trade association, federal and state regulations.

### ■ Site Survey

Inspect site where motor will be mounted. Ensure that mounting surface will be big enough for motor and operator. Refer to motor Product Information manuals for specific information on mounting surface requirements, attaching hardware and power supply requirements. Survey site to ensure operator ability to reach all controls comfortably and observe loads during operation.

#### WARNING

• **Supporting structures and load-attaching devices used in conjunction with this motor must meet or exceed the design safety factor to handle the rated load, plus the weight of the motor and attached equipment. This is the customer's responsibility. If in doubt, consult a registered structural engineer.**

When installing a motor ensure that installation personnel are trained and certified to perform the tasks. The use of licensed electricians or registered structural engineers might be required. Use of factory trained, certified personnel will ensure safe installation and that all items used in the installation will meet federal, state and local code requirements.

### ■ Moving the Motor

Once the motor is ready to move to the mounting site, weight of complete motor must be determined. This will ensure that lifting equipment with enough capacity is used. The basic weight of the motor is found in the motor Product Information manuals, however, the addition of valves, guards, air preparation packages or other owner added items can cause the finished weight to be much greater.

#### CAUTION

• **The addition of items to the motor can affect the CENTER of GRAVITY. On the initial lift ensure motor does not "roll, tilt or shift".**  
• **Use lifting eyes on motor to lift only the motor. Do not use lifting eyes on motor to lift additional equipment attached to the motor.**

To rig a motor for moving, use nylon slings or hooks of the correct capacity in the lifting eyes. Rig the motor in a manner to prevent any "rolling or shifting" during movement. Ensure that lifting equipment has clear access and can easily reach the mounting site.

With motor rigged to move and the correct lifting equipment attached, on the initial lift, only lift motor a couple of inches (50 - 75 mm) and determine stability of rigging before continuing. If motor is stable, continue with installation.

### ■ Mounting

Check that sufficient space is available to operate motor control, or other components and to make inspections or adjustments when necessary. Do not weld on motors. Welding can change the physical properties of some of the parts, which can affect strength or durability. Excessive heat can be generated which can affect and/or damage internal parts such as seals and bearings.

1. The motor mounting surface must be flat and of sufficient strength to handle the rated capacity of the motor plus the weight of the motor and attached equipment. An inadequate mounting surface may cause distortion or twisting of the motor mounting frame resulting in motor damage.
2. Make sure the mounting surface is flat to within 0.005 inch (0.127 mm).
3. Mounting bolts must be Grade 8 or better. Use self locking nuts or nuts with lockwashers.
4. Ensure mounting bolts are of the size specified in the "Product Information" manuals. Tighten evenly and torque to specifications. If fasteners are plated, lubricated or a thread locking compound is used, torque appropriately.
5. Driven loads should be balanced to eliminate abnormal loading of the air motor bearings due to radial vibration.

### ■ Ergonomics

Operator's position at the controls should allow the operator to maintain a comfortable, well-balanced posture. The position should also allow easy access to all controls without reaching. In this position, the operator should be able to view the load during entire cycle of movement. This position along with recommended guards should provide the maximum protection to operator.

The operator's position should also be free of obstructions both overhead and on the sides. The operators area must be well ventilated, kept oil free and clear of unnecessary equipment/tools etc. and be provided with a non-skid surface.

### ■ Power Supply

For all types of motors there is a recommended power supply input for the best performance, refer to the "Product Information" manual. A power supply of less than recommended will result in reduced motor performance and may cause motor to function incorrectly.

Do not exceed the rated power supply.

#### WARNING

- **Ensure that all power supply connections are tight.**
- **Check electrical grounding (earth) is complete.**

Comply with any other safety precautions to ensure a good, safe, power source connection at the motor.

Air powered motors require filtration before the control valve. Refer to "Product Information" manual for specific filtration level, type and location. Without filtration, contaminants can enter the system and cause components to malfunction.

### ■ Exhaust

On pneumatic powered motors, careful consideration must be given to the exhaust. Make sure motors are positioned in a well ventilated area. Do not allow personnel to stand in the exhaust stream as this can result in injury.

1. **Noise.** Using piping or tubing to move exhaust away from operator can reduce this. The addition of a muffler is also recommended to reduce noise level.
2. **Misting.** Clean and remove any build-up of oily residue in area.

### ■ Shut-off Valve

Refer to shut-off valve motor installation Dwg. MHP2459 on page 6, **A.** Air Flow; **B.** Open; **C.** Closed; **D.** Ball Valve; **E.** Fitting Nipple.

On all air motor installations an emergency shut-off valve/switch should be installed in the inlet port of the control valve, to provide the operator with a positive way of stopping motor operation in the event of an emergency.

Valve shall be installed within easy range of the operator and positioned so that activation can occur quickly, and any person in the area of the motor can also activate the valve. Train people to its location and use.

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## ■ Guards

Guarding moving parts of a motor from accidental contact with personnel shall be a prime consideration.

Guards, not provided by **Ingersoll Rand**, may be required to protect hazardous areas around the motor. Guards should be used to protect against any accidental contact

with the motor output shaft and other system components. Guard air motor from impact that may result in a spark.

Guards shall not cause an operator to work in a non-stable or ergonomically incorrect position.

Ensure guards are in place and secure prior to operating motor. Ensure they do not interfere with output shaft rotation or motor control operation.

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## MOTOR OPERATORS DUTIES AND RESPONSIBILITIES

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While operating a motor, operators should always use personal protective equipment appropriate to the operation. As a minimum this should include safety glasses, hearing protection, gloves, safety shoes and hard hat. Other safety items as required by individual companies should also be used.



(Dwg. MHP2452)



(Dwg. MHP2455)



(Dwg. MHP2594)



(Dwg. MHP2596)



(Dwg. MHP2595)

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## ■ Inspections

Daily visual inspections should be performed by the motor operator at the start of each shift, or at the time the motor is first used during each shift. Refer to "MOTOR INSPECTION" section in the Product Information Manual provided with the motor. The motor operator shall not perform periodic inspections, or maintenance on a motor unless the operator is an **Ingersoll Rand** trained Technician and can perform such inspections or maintenance, and is designated by the motor owner to perform such inspections or maintenance.

Ensure that all Warning and Operation labels and tags are attached and legible. Also, ensure that data (name) plate is attached and legible. Refer to the Product Information manuals for requirements.

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## ■ Motor Operators Responsibilities

Participate in any motor training programs and be familiar with topics outlined in "Training Programs" on page 3.

It is the responsibility of the operator to exercise caution, use common sense and be familiar with operating procedures and duties.

Operators are not required to maintain the motor however, they are responsible for operation and visual inspection of motor. If there is a question concerning safe operation of the motor, the operator shall refuse to operate it until all concerns are resolved.

Operators shall be physically competent and have no health condition which might affect their ability to act, and they must have good hearing. Operators who are fatigued or have exceeded their normal shift period shall check all related regulations regarding approved work periods prior to operating equipment. The operator must have a good attitude regarding safety.

### Motor Operators Shall:

1. Be familiar with the motor controls before operating the motor.
2. Watch for potential motor malfunctions that may require adjustment or repair.
3. Stop operation if malfunctions occur, and immediately advise their supervisor so corrective action can be taken.
4. Be aware of shut-off valve location and proper operation.
5. Confirm that motor inspections have been completed.

### Motor Operators Should:

1. Have normal depth perception, field of vision, reaction time, manual dexterity, and coordination for the work being performed.
2. NOT be subject 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 others.
3. NOT operate a motor when under the influence of alcohol or drugs.
4. NOT operate a motor when under the influence of medication that could result in actions of the operator being a hazard to the operator or others.
5. Verify that lubrication levels are correct.
6. Ensure power supply connections are tight and connected correctly.
7. Check direction indicators on control match load direction.

The operator must know the motor capacity during all operations. It is the operators' responsibility to ensure that the load does not exceed this rating. On **Ingersoll Rand** data (name) plates the capacities of the motor to which it is attached are listed. The data (name) plate information used in conjunction with the Operation manuals will give the operator the specific capacities of the motor.

Items to consider as part of the load:

- Shock loads that could cause the load to exceed motor rated capacity.

## MOTOR OPERATION

### ■ General Operating Instructions

The following operating instructions have been adapted in part from American National (Safety) Standard ASME B30.7 and are intended to avoid unsafe operating practices that might lead to injury or property damage. Refer to specific sections in the Operation Manuals for additional safety information.

The four most important aspects of motor operation are:

1. Follow all safety instructions when operating motor.
2. Allow only people trained in safety and operation of this motor to operate this equipment. Refer to "Training Program" on page 3.
3. Subject each motor to a regular inspection and maintenance procedure.
4. Be aware of motor capacity and equipment capabilities at all times.



- If a problem is detected, immediately STOP operation and notify supervisor. DO NOT continue operation until problem is corrected.

### ■ Additional Important Motor Operating Procedures

1. Output shaft speeds shall be operator-controlled and be consistent with application requirements. Any applicable codes and standards should be followed.
2. The motor operator should remain at the controls when equipment is in use.
3. When a "DO NOT OPERATE" sign is placed on the motor, or controls, do not operate the motor until the sign has been removed by designated personnel.
4. Keep hands, clothing, jewelry, etc. away from output shaft and other moving parts.
5. Operate the motor with smooth control movements. Do not jerky actions.
6. Immediately stop operation if motor does not respond to motor control.
7. The use of non-slip footwear is recommended if motor is located in an area that may be muddy, wet or have slippery surfaces.

At the completion of motor operation or when in a non-operational mode the following actions should occur:

- Turn off/shut off or disconnect power supply.
- Secure motor against unauthorized and unwarranted use.

### ■ Operating In Cold Weather

Cold weather operation can present additional hazards. At very cold temperatures metal can become brittle. Use extreme care to ensure that load movements are smooth and even. Lubricating fluids do not flow as readily. Make every effort to warm all fluids and components before operation. Run motor slowly in both directions with no load to initially lubricate components.

Operators will also be wearing increased clothing so operation, feel of controls, field of vision and hearing could be impaired. Ensure that appropriate action is taken to maintain safe operation.



- Avoid sudden loading and erratic control operation.

Whenever temperature is below freezing, 32° F (0° C), extreme caution must be exercised to ensure that no part of motor, supporting structure or attached equipment is shock loaded or impacted as brittle fracture of steel may result.



- Keep hands and clothing clear of gaps or spaces on motor and equipment. These areas can become pinch points during operation.

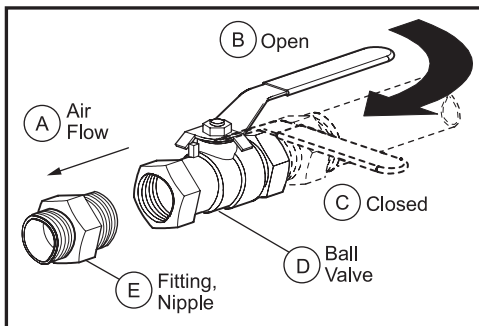


(Dwg. MHP2454)

To minimize the possibility of contact do the following:

- Maintain a firm grip motor throttle control lever.
- Ensure footing is clean, dry and firm.
- Maintain a good comfortable posture, do not lean.
- Ensure any loose clothing is tucked in or out of the way of moving parts.
- Ensure Guards are installed.

## PRODUCT GRAPHIC



(Dwg. MHP2459)

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**SERVICE NOTES**

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