 <p><b>YORK</b><sup>®</sup></p> <p>BY JOHNSON CONTROLS</p>	<p><b>MEDIUM VOLTAGE VARIABLE SPEED DRIVE</b></p>	
<p><b>SAFETY INSTRUCTIONS</b></p>	<p>Supercedes: 160.00-S1 (906)</p>	<p>Form 160.00-S1 (609)</p>

**MEDIUM VOLTAGE 500 - 2500 HP  
2300V, 4160V, 6600V, 12470V, 13800V, 60Hz &  
3300V, 6600V, 10000, 11000 50Hz  
VARIABLE SPEED DRIVES for  
YK CHILLER APPLICATIONS**

**1.0 Purpose**

This document describes the required warnings and safety instructions to be used in the creation of YORK's Medium Voltage - Variable Speed Drive (MV-VSD) Installation, Operation, and Maintenance manuals.

**2.0 Scope**

This information is to apply to all newly created YORK MV-VSD Installation, Operation, and Maintenance manuals.

**3.0 Reference Information Sources**

- 3.1 UL Standard for Safety for Power Conversion Equipment — UL 508C.
- 3.2 National Fire Protection Association.
- 3.3 WWW.OSHA.GOV.
- 3.4 National Electrical Code.
- 3.5 Product Safety Procedure, Section 11.0 Product Manual Guidelines Responsibility It is the responsibility of the creator of the manual to adhere to the requirements provided in this document.

**4.0 Procedure**

Refer to this document for the minimum requirements for safety information to be contained within YORK's MV-VSD Installation, Operation, and Maintenance manuals. Pages 2 through 12 contain the required information to be included.

**5.0 Training or Knowledge**

The users of YORK's MV-VSD Installation, Operation, and Maintenance manuals are to be aware of the requirements stated in this document.

# IMPORTANT!

## READ BEFORE PROCEEDING!

### GENERAL SAFETY GUIDELINES

The instructions contained in this manual are not intended to cover all details or variations in equipment types, nor may it provide for every possible contingency concerning the installation, operation, or maintenance of this equipment. Should additional information be required contact your YORK/Johnson Controls representative.

The contents of this manual shall not become a part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of YORK/Johnson Controls. The warranty contained in the contract between the parties is the sole warranty of YORK/Johnson Controls and any statements contained herein do not create new warranties or modify the existing warranty.

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, oils, materials under pressure, rotating components, and

both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is required that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

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This instruction lists the warnings of the YORK Medium Voltage Variable Speed Drive (MV-VSD). Qualification in this case requires that the individual hold a certificate, proving satisfactory completion of formal training on proper procedures and safety requirements for working on equipment in the medium voltage (600 VAC to 15,000 VAC) class. The qualified individual furthermore is to be knowledgeable of, and adhere to, all safe work practices as required by NEC, OSHA, and NFPA 70E.

Because available fault current is determined largely due to sizing of the upstream transformers, wiring, and protective devices - available fault current and arc-flash hazard levels must be determined by personnel responsible for the electrical systems within the facility where this product is installed. Proper personal protective equipment (PPE) is to be utilized where and when required. This entire publication is to be read thoroughly before servicing this product. Proper lock-out and tag-out procedures are mandatory!



***Under no circumstances should any live testing be performed with the main cabinet doors open, exposing medium voltage components! Only the low-voltage access door is permitted to be open during live testing or operation of the unit. The energized safe approach distance for this product is to be determined by NFPA 70E. Non-qualified personnel are NOT to be present within this boundary during energizing, de-energizing, or energized testing (even with cabinet doors closed) on this equipment!***

## **MANUAL'S PURPOSE AND SCOPE**

This manual provides information on how to safely install, operate, and maintain your YORK power electronics product. This manual includes a section of general safety instructions that describes the warning labels and symbols that are used throughout the manual. Read the manual completely before installing, operating, or performing maintenance on this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in metric and/or the English equivalent. Operation, Maintenance, and Renewal Parts manuals are available from YORK.

YORK/Johnson Controls reserves the right, without prior notice, to update information, make product changes, or to discontinue any product or service identified in this publication.

YORK is a registered trademark of the Johnson Controls Incorporated. All other product or trade references appearing in this manual are registered trademarks of their respective owners.

YORK/Johnson Controls shall NOT be liable for direct, indirect, special, or consequential damages resulting from the use of the information contained within this manual.

## **CONTACTING YORK/JOHNSON CONTROLS CUSTOMER SUPPORT**

YORK/Johnson Controls Customer Support can be contacted to obtain help in resolving any Medium Voltage - Variable Speed Drive system problem that you may experience or to provide application information.

To find the local service office contact the Support Center's toll free number (800) 861-1001.

The local service office is open from 8 a.m. to 5 p.m., Monday through Friday.

For further information on YORK's products and services, please visit our website at [www.york.com](http://www.york.com).

## GENERAL SAFETY INSTRUCTIONS

Do **NOT** attempt to install, operate, maintain or dispose of this equipment until you have read and understood all of the product safety information and directions that are contained in this manual.

### Safety Alert Symbol

The Safety Alert Symbol indicates that a potential personal injury hazard exists. The symbol is comprised of an equilateral triangle enclosing an exclamation mark.



### Signal Words

Listed below are the signal words that are used throughout this manual followed by their descriptions and associated symbols. When the words **DANGER**, **WARNING** and **CAUTION** are used in this manual they will be followed by important safety information that must be adhered to.



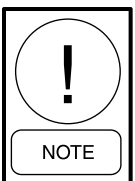
*The word **DANGER** preceded by the safety alert symbol indicates that an imminently hazardous situation exists that, if not avoided, will result in death or serious injury to personnel.*



*The word **WARNING** preceded by the safety alert symbol indicates that a potentially hazardous situation exists that, if not avoided, could result in death or serious injury to personnel.*



*The word **CAUTION** preceded by the safety alert symbol indicates that a potentially hazardous situation exists which, if not avoided, may result in minor or moderate injury.*



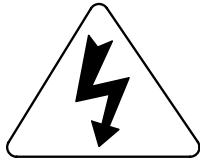
***NOTE** is used to highlight additional information which may be helpful to you.*

## SPECIAL SYMBOLS

To identify special hazards, other symbols may appear in conjunction with the **DANGER**, **WARNING**, and **CAUTION** signal words. These symbols indicate areas that require special and/or strict adherence to the procedures to prevent serious injury to personnel or death.

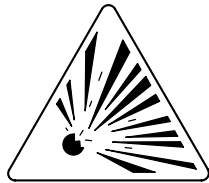
### Electrical Hazard Symbol

A symbol which indicates a hazard of injury from electrical shock or burn. It is comprised of an equilateral triangle enclosing a lightning bolt.



### Explosion Hazard Symbol

A symbol which indicates a hazard of injury from exploding parts. It is comprised of an equilateral triangle enclosing an explosion image.

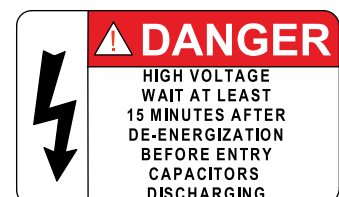
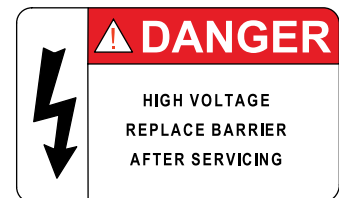
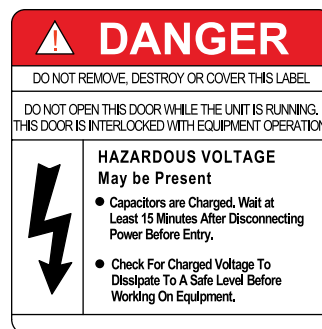
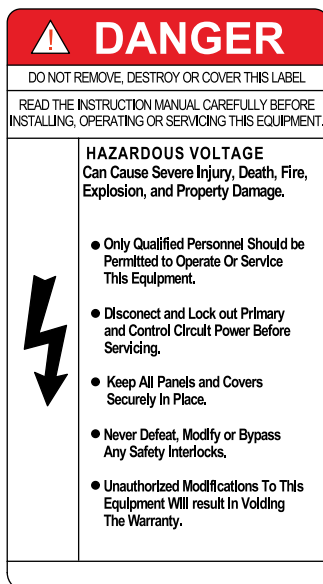


## EQUIPMENT WARNING LABELS

Do **NOT** attempt to install, operate, perform maintenance, or dispose of this equipment until you have read and understood all of the product labels and user directions that are contained in this manual.

Shown below are examples of safety labels that may be found attached to the equipment. Do **NOT** remove or cover any of the labels. If the labels are damaged or if additional labels are required, contact your YORK representative for additional labels.

Labels attached to the equipment are there to provide useful information or to indicate an imminently hazardous situation that may result in serious injury, severe property and equipment damage, or death if the instructions are not followed. Shown below are some examples of labels that can be found placed on the equipment.



## QUALIFIED PERSONNEL

Installation, operation, and maintenance shall be performed by Qualified Personnel Only. A Qualified Person is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

### Qualified Personnel shall:

- Have read the entire operation manual.
- Be familiar with the construction and function of the MV-VSD, the equipment being driven, and the hazards involved.
- Be able to recognize and properly address hazards associated with the application of motor-driven equipment.
- Be trained and authorized to safely energize, de-energize, ground, lockout/tagout circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
- Be trained in rendering first aid.

For further information on workplace safety visit [www.osha.gov](http://www.osha.gov).

## EQUIPMENT INSPECTION

- Upon receipt of the equipment inspect the packaging and equipment for shipping damage.
- Carefully unpack the equipment and check for parts that were damaged from shipping, missing parts, or concealed damage. If any discrepancies are discovered, it should be noted with the carrier prior to accepting the shipment, if possible. File a claim with the carrier if necessary and immediately notify your YORK representative.
- Do **NOT** install or energize equipment that has been damaged. Damaged equipment may fail during operation resulting in further equipment damage or personal injury.
- Check to see that the rated capacity and the model number specified on the nameplate conform to the order specifications.
- Modification of this equipment is dangerous and must not be performed except by factory trained representatives. When modifications are required contact your YORK/Johnson Controls representative.
- Inspections may be required before and after moving installed equipment.
- Keep the equipment in an upright position as indicated on the shipping carton.
- Contact your YORK/Johnson Controls representative for assistance if required.

## HANDLING AND STORAGE

- Use proper lifting techniques when moving the MV-VSD; including properly sizing up the load, getting assistance, and using a forklift if required.
- Store in a well-ventilated covered location and preferably in the original carton if the equipment will not be used upon receipt.
- Store in a cool, clean, and dry location. Avoid storage locations with extreme temperatures, rapid temperature changes, high humidity, moisture, dust, corrosive gases, or metal particles.
- Do not store the unit in places that are exposed to outside weather conditions (i.e., wind, rain, snow, etc.).
- Store in an upright position as indicated on the shipping carton.
- Include any other product-specific requirements.

## DISPOSAL

Never dispose of electrical components via incineration. Contact your state environmental agency for details on disposal of electrical components and packaging in your area.

## INSTALLATION PRECAUTIONS

### Location and Ambient Requirements

- Adequate personnel working space and adequate illumination must be provided for adjustment, inspection, and maintenance of the equipment (refer to NEC Article 110-34).
- Avoid installation in areas where vibration, heat, humidity, dust, fibers, steel particles, explosive/ corrosive mists or gases, or sources of electrical noise are present.
- Do not install the MV-VSD where it may be exposed to flammable chemicals or gasses, water, solvents, or other fluids.
- The installation location shall not be exposed to direct sunlight.
- Allow proper clearance spaces for installation. Do not obstruct the ventilation openings. Refer to the recommended minimum installation dimensions as specified in the installation section of the operation manual.
- The ambient operating temperature shall be between (32F° to 104F° and 0°C to 40°C).

## MOUNTING REQUIREMENTS

- Only Qualified Personnel should install this equipment.
- Install the unit in a secure upright position in a well-ventilated area.
- A noncombustible insulating floor or mat should be provided in the area immediately surrounding the electrical system at the place where maintenance operations are to be performed.
- As a minimum, the installation of the equipment should conform to the NEC Article 110 Requirements For Electrical Installations, OSHA, as well as any other applicable national, regional, or industry codes and standards.
- Installation practices should conform to the latest revision of NFPA 70E Electrical Safety Requirements for Employee Workplaces.

## CONDUCTOR ROUTING AND GROUNDING

- Use separate metal conduits for routing the input power, output power, and control circuits.
- A separate ground cable should be run inside the conduit with the input power, output power, and control circuits.
- Do **NOT** connect control terminal strip return marked CC to earth ground.
- Always ground the unit to prevent electrical shock and to help reduce electrical noise.
- It is the responsibility of the person installing the ASD or the electrical maintenance personnel to provide proper grounding and branch circuit protection in accordance with the 2002 NEC and applicable local codes.



***The metal of conduit is NOT an acceptable ground.***

## CONNECTIONS



***Contact with energized wiring will cause severe injury or Death.***

- Turn off, lockout, and tagout all power sources before proceeding to connect the power wiring to the equipment.
- After ensuring that all power sources are turned off and isolated in accordance with established lockout/tagout procedures, connect three-phase power source wiring of the correct voltage to the correct input terminals and connect the output terminals to a motor of the correct voltage and type for the application (refer to NEC Article 300 – Wiring Methods and Article 310 – Conductors For General Wiring). Size the branch circuit conductors in accordance with NEC Table 310.16.
- If multiple conductors are used in parallel for the input or output power, each branch of the parallel set shall have its own conduit and not share its conduit with other parallel sets (i.e., place L1, L2, and L3 in one conduit and a second L1, L2, and L3 in another) (refer to NEC Article 300.20 and Article 310.4). National and local electrical codes should be referenced if three or more power conductors are run in the same conduit (refer to 2002 NEC Article 310 adjustment factors on page 70-142).
- Ensure that the 3 phase input power is **NOT** connected to the output of the MV-VSD. This will damage the VSD and may cause injury to personnel.
- Do **NOT** install the MV-VSD if it is damaged or if it is missing any component(s).
- Do **NOT** connect resistors across terminals PA – PC or PO – PC. This may cause a fire.
- Turn the power on only after attaching and/or securing the front cover.

## PROTECTION

- Ensure that primary protection exists for the input wiring to the equipment. This protection must be able to interrupt the available fault current from the power line. The equipment may or may not be equipped with an input disconnect (option).
- All cable entry openings must be sealed to reduce the risk of entry by vermin and to allow for maximum cooling efficiency.
- Follow all warnings and precautions and do not exceed equipment ratings.

## SYSTEM INTEGRATION PRECAUTIONS

The following precautions are provided as general guidelines for the setup of the MV-VSD within the system.

- The YORK MV-VSD is a system component and the system design should take this into consideration. Please contact YORK marketing for application-specific information and for training support.
- The YORK MV-VSD is part of a larger system and the safe operation of the device will depend on observing certain precautions and performing proper system integration.
- A detailed system analysis and job safety analysis should be performed by the systems designer and/or systems integrator before the installation of the MV-VSD component. Contact YORK/Johnson Controls marketing for options availability and for application-specific system integration information if required.

## PERSONNEL PROTECTION

- Installation, operation, and maintenance shall be performed by Qualified Personnel Only.
- A thorough understanding of the MV-VSD will be required before the installation, operation, or maintenance of the VSD.
- Rotating machinery and live conductors can be hazardous and shall not come into contact with humans. Personnel should be protected from all rotating machinery and electrical hazards at all times.
- Insulators, machine guards, and electrical safeguards may fail or be defeated by the purposeful or inadvertent actions of workers. Insulators, machine guards, and electrical safeguards are to be inspected (and tested where possible) at installation and periodically after installation for potential hazardous conditions.
- Do **NOT** allow personnel near rotating machinery. Warning signs to this effect shall be posted at or near the machinery.
- Do **NOT** allow personnel near electrical conductors. Human contact with electrical conductors can be fatal. Warning signs to this effect shall be posted at or near the hazard.
- Personal protection equipment shall be provided and used to protect employees from any hazards inherent to system operation.

## SYSTEM SETUP REQUIREMENTS

- External or ancillary system components should be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in personnel injury or system damage (i.e., E-Off, Auto-Restart settings, System Interlocks, etc.).
- The failure of external or ancillary components may cause intermittent system operation, i.e.; the system may start the motor without warning.
- There may be thermal or physical properties, or ancillary devices integrated into the overall system that may allow for the MV-VSD to start the motor without warning. Signs at the equipment installation must be posted to this effect.
- Additional warnings and notifications shall be posted at the equipment installation location as deemed required by Qualified Personnel.

## OPERATIONAL AND MAINTENANCE PRECAUTIONS



- Turn off, lockout, and tagout the main power, the control power, and instrumentation connections before inspecting or servicing the drive, or opening the door of the enclosure.
- Turn off, lockout, and tagout the main power, the control power, and instrumentation connections before proceeding to disconnect or connect the power wiring to the equipment.
- The capacitors of the MV-VSD maintain a residual charge for a period of time after turning the VSD off. The required time for each VSD typeform is indicated with a cabinet label and a Charge LED. Wait for at least the minimum time indicated on the label and ensure that the Charge LED has gone out before opening the door of the VSD once the VSD power has been turned off.
- Do **NOT** attempt to disassemble, modify, or repair the MV-VSD. Call your YORK service representative for repair information.
- Do **NOT** place any objects inside of the MV-VSD.
- Turn the power on only after attaching (or closing) the front cover and do **NOT** remove the front cover of the MV-VSD when the power is on.
- If the MV-VSD should emit smoke or an unusual odor or sound, turn the power off immediately.
- The heat sink and other components may become extremely hot to the touch. Allow the unit to cool before coming in contact with these items.
- Remove power from the MV-VSD during extended periods of non-use.
- The system should be inspected periodically for damaged or improperly functioning parts, cleanliness, and to ensure that the connectors are tightened securely.
- Ensure that the Run functions (F, R, Preset Speed, etc.) of the MV-VSD are off before performing a Reset. The post-reset settings may allow the VSD to start unexpectedly.
- In the event of a power failure, the motor may restart after power is restored.
- Retry or Reset settings may allow the motor to start unexpectedly. Warnings to this effect should be clearly posted near the MV-VSD and motor.



***Do NOT install, operate, perform maintenance, or dispose of this equipment until you have read and understood all of the product warnings and user directions. Failure to do so may result in equipment damage, operator injury, or loss of life.***



**BY JOHNSON CONTROLS**

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