



ENGINEERED AIR

**INSTALLATION, OPERATION
AND MAINTENANCE MANUAL
FOR
MP SERIES
PACKAGED PUMPS**

UNIT MODEL NO. _____
UNIT SERIAL NO. _____
SERVICED BY: _____
TEL. NO: _____

**CANADIAN
HEAD OFFICE
AND FACTORY**

1401 HASTINGS CRES. SE
CALGARY, ALBERTA
T2G 4C8
Ph: (403) 287-2590
Fx: 888-364-2727
Parts:

**USA
HEAD OFFICE
AND FACTORY**

32050 W. 83rd STREET
DESOTO, KANSAS
66018
Ph: (913) 583-3181
Fx: (913) 583-1406
Parts:

**CANADIAN
EASTERN FACTORY**

1175 TWINNEY DRIVE
NEWMARKET, ONTARIO
L3Y 5V7
Ph: (905) 898-1114
Fx: (905) 898-7244
Parts:

SALES OFFICES ACROSS CANADA AND USA

Retain instructions with pump package and maintain in a legible condition.
Please give model number and serial number when contacting
factory for information and/or parts.

www.engineeredair.com/manuals

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YOU HAVE RESPONSIBILITIES TOO

This installation, operation and maintenance manual can not cover every possibility, situation or eventuality. Regular service, cleaning and maintaining the equipment is necessary. If you are not capable of performing these tasks, hire a qualified service specialist. Failure to perform these duties can cause property damage and/or harm to the building occupants and will void the manufacturers' warranty.

INTRODUCTION

Engineered Air pump packages are high quality products designed and manufactured to provide many years of trouble-free operation. We recommend that this manual be read thoroughly to ensure proper installation, efficient operation and proper maintenance of this equipment. The submittal record is considered to be part of the Installation, Operation and Maintenance Manual. Please report any omissions to the national service manager.

SAFETY PRECAUTIONS

Read, understand and follow the complete manual before beginning the installation, including all safety precautions and warnings.

Warning:



Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

Warning:



This unit is connected to high voltages. Electrical shock or death could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. Injury or death could occur if instructions are not followed. All work should be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.

WARRANTY

LIMITED WARRANTY ENGINEERED AIR will furnish without charge, F.O.B. factory, freight collect, replacement parts for, or repairs to products covered herein which prove defective in material or workmanship under normal and proper use for a period of twelve (12) months from the initial start-up or eighteen (18) months from the date of shipment, whichever expires sooner, provided the customer gives ENGINEERED AIR written notice of such defects within such time periods and provided that inspection by ENGINEERED AIR establishes the validity of the claim and all pertinent invoices have been paid in full. The repairs or replacements will be made only when the complete product(s) or part(s) claimed to be defective are returned to ENGINEERED AIR or a depot designated by ENGINEERED AIR, transportation charges prepaid. Repairs or replacements as provided for by this paragraph shall constitute fulfillment of all ENGINEERED AIR's obligations with respect to this warranty. The refrigerant charge is not included in any part of this warranty. This warranty does not apply to any products or parts thereof that have been subject to accident, misuse or unauthorized alterations, or where ENGINEERED AIR's installation and service requirements have not been met.

The foregoing warranty is in lieu of all other warranties, express or implied. ENGINEERED AIR specifically disclaims any implied warranty of merchantability and/or fitness for purpose. Under no circumstances shall ENGINEERED AIR be liable to, nor be required to indemnify, Buyer or any third parties for any claims, losses, labor, expenses or damages (including special, indirect, incidental, or consequential damages) of any kind, resulting from the performance (or lack thereof) of this Agreement or the use of, or inability to use the goods sold hereunder, including, but not limited to, damages for delay, temporary heating/cooling costs, loss of goodwill, loss of profits or loss of use. Furthermore, the parties agree that the Buyer's sole remedy under this Agreement shall be limited to the limited warranty set forth in the preceding paragraph relating to the repair or replacement of any defective goods. Under no circumstances shall any claim or award against ENGINEERED AIR exceed the original contract price whether awarded through arbitration, litigation or otherwise.

ENGINEERED AIR Warranty is void if:

- 1 The pump package is not installed in accordance with this manual.
- 2 The start-up and operation of the pump package is not performed in accordance with this manual.
- 3 The pump package is operated in an atmosphere containing corrosive substances.
- 4 The pump package is used to pump corrosive substances.
- 5 The pump package is operated in a system that exceeds its rated pressure.
- 6 The pump package is allowed to operate during building construction.

CODES


In Canada:


- 1 The installation of this pump package shall be in accordance with the latest edition of the Canadian Electrical Code, Part 1 – CSA standard 22.1, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.
- 2 This pump package shall be electrically grounded in accordance with the latest edition of the Canadian Electrical Code, Part 1 – CSA standard 22.1, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.
- 3 The installation of this pump package shall be in accordance with the latest edition of the National Plumbing Code of Canada, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.
- 4 The installation of this pump package shall be in accordance with all other National, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.

In USA:

- 1 The installation of this pump package shall be in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70), State and Local Codes and in accordance with the local authorities having jurisdiction.
- 2 This pump package shall be electrically grounded in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70), State and Local Codes and in accordance with the local authorities having jurisdiction.
- 3 If the pump package has not been provided with an electric disconnect switch, one of adequate ampacity shall be installed in accordance with Article 430 of the National Electrical Code (ANSI/NFPA 70).
- 4 The installation of this pump package shall be in accordance with the latest edition of the National Standard Plumbing Code (NSPC), State and Local Codes and in accordance with the local authorities having jurisdiction.
- 5 The installation of this pump package shall be in accordance with all other National, State and Local Codes, and in accordance with the local authorities having jurisdiction.

Warning: Only equipment bearing a CSA C22.2 No. 213 or UL 1604 rating plate (label) with an accompanying CSA Certification mark can be installed in a hazardous location. The hazardous location must conform with the Class, Division, Group and temperature code (if shown) displayed on the rating plate (label).

 If not marked as noted above, the pump package is not rated for hazardous locations and cannot be installed in areas requiring any hazardous location rating.



RECEIVING

Refer to the back of the packing slip for receiving pump package instructions.

On receipt of the pump package, check for damage. Inspect protective covers for punctures or other signs that there may be internal damage. Remove protective covers and check for internal damage. Replace covers if the pump package is not being assembled or installed at this time.

All pump packages are pre-tested at the factory immediately prior to shipping and are ensured to be in good operating condition at that time. If damage is found follow the instructions on the packing slip. If possible, take photographs of the damage. Report any damage to the shipping carrier and to Engineered Air.

On receipt of the pump package, check electrical characteristics (see rating plate) to make sure the pump package voltage is compatible with that available for the pump package. All parts for field installation are listed on the shipping order form.


TEMPORARY STORAGE

If a pump package is to be stored prior to installation the following precautions are required:

- 1 Store in a well drained area that will not accumulate surface water.
- 2 Store in an area where the pump package will not get damaged.
- 3 The entire perimeter and any full height cross members of the pump package shall be supported by a level surface and the supporting surface must be adequate for supporting the entire weight of the pump package.
- 4 All protective coverings that were provided for shipping must be in place.
- 5 Protect from rain or snow.

LIFTING

Engineered Air pump packages are constructed on a structural steel base frame. If using a lift truck, ONLY lift using the perimeter structural frame. DO NOT allow forks to lift on cabinets or components.

Warning:  **Injury or death can result from improper rigging and lifting. Rigging and lifting of equipment must be performed by qualified personnel with proper equipment using appropriate and approved safety precautions.**

INSTALLATION

At all times of the year pump packages are purged with a glycol solution to prevent freeze damage during shipping. Some residual solution may be present. Depending on the application, the pump package may have to be flushed prior to use. Dispose of the glycol as required by local authorities having jurisdiction.

MOUNTING

Pump packages shall be mounted level. Failure to do so can cause fluid to be trapped or operational problems that can void warranty.

Pump packages are not intended for outdoor installation and are not intrinsically protected from the elements, or freezing.

Unless the pump package is specifically designed for point or other mounting, the base of the pump package must be supported continuously by a mounting support system that is directly below the pump package structural base frame and runs the entire length and width of the pump package. Refer to the Submittal Record for mounting information. Pump packages 100" (2500mm) wide and under can be supported on each side continuously along the length of the pump package. Sleepers installed perpendicular to the length of the pump package must be continuous and shall be installed at all lifting points and mid-way between lifting points as a minimum.

MINIMUM CLEARANCES

It is recommended the pump package have 3 ft (1 m) of free area on all sides for servicing of pumps, motors and all controls. The pump package shall be located away from any outside air intake to avoid potential freezing. The pump package must be far enough from any wall to allow for safe servicing. Local codes must always be followed for minimum clearance.

Model	Minimum Clearance	
	Sides and Back	Control Panel
MP Pump	24" (610)	42" (1067)

SHIPPING MATERIALS

Remove shipping materials. These may include, but are not limited to protective covers, tie-down bolts, straps and blocks on pumps and components.

ASSEMBLY

When locating the pump package, consideration must be given for the process fluid piping, city water make-up, sanitary drain and electrical service.

The pump package shall be installed on a concrete foundation or support structure of sufficient strength to support the operating weight of the pump package (i.e. fluid and piping). The pump package must be within ¼" of level over its length and width. All frame contact points must be in contact with the support foundation. If required, shims must be used to prevent the frame from warping.

PIPING

When installing any piping system do not allow dirt, scale, sand, etc. to enter any part of the system.

The city water make-up line may require a back-flow preventer. Check with the local authorities having jurisdiction. Refer to the job specification for any additional requirements.

PIPING CONNECTIONS

All piping is to be installed by a qualified pipe fitter. Always use a back-up wrench for all threaded connections.

All piping must be self-supporting and allow for thermal expansion and contraction. Damage caused to the equipment by improperly supported piping will void the warranty.

FLUSHING AND CLEANING

Pump packages may contain material or residue from manufacturing, transportation or storage. To prevent possible damage to the pump package or other components in the system, the pump package must be flushed and degreased. Consult a qualified fluid treatment specialist. Any such damage is not covered under warranty.

Untreated or improperly treated water, glycol or other fluids not approved for use in the pump system may cause damage to the pump package and/or other components in the system. Only use water, inhibited glycol or other fluids suitable for use in commercial heating and cooling systems. Consideration must be given to the type piping and the materials used in the system piping. Follow the glycol manufacturer's recommendation for commercial heating and cooling systems for treatment, mixing and filling.

Caution:



Ensure that the fluids and chemicals used when flushing and cleaning are compatible with the final circulating fluid.

SERVICE CONNECTIONS

Do not install anything that will interfere with equipment access or the rating plate.


ELECTRICAL CONNECTIONS

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The unit must be electrically grounded and all wiring must be installed in accordance with the National Electrical Code, ANSI/NFPA 70, and/or the Canadian Electrical Code CSA 22.1 and to the approval of the authorities having jurisdiction. Field wiring diagrams, internal wiring diagrams and operating functions are included in the control cabinet. The power requirements are indicated on the rating plate. Where field wiring of control circuits is required, take care to size the field wiring for a maximum 10% voltage drop. The control circuit ampacity is noted on the field wiring diagram. See the field wiring diagram for requirements for shielded or twisted pair wire for solid state devices.

Warning: No unspecified external load shall be added to the control transformer circuit(s) or to the main power circuit(s).



Recommended 24V Field Wiring Size

Circuit Load (Amps)	Maximum Total Length of Run									
	< 50 ft ~ 15 m	< 100 ft ~ 30 m	< 150 ft ~ 45 m	< 200 ft ~ 60 m	< 250 ft ~ 75 m	< 300 ft ~ 90 m	< 350 ft ~ 105 m	< 400 ft ~ 120 m	< 450 ft ~ 135 m	< 500 ft ~ 150 m
1	16 AWG	16 AWG	16 AWG	16 AWG	16 AWG	16 AWG	14 AWG	14 AWG	14 AWG	12 AWG
2	16 AWG	16 AWG	16 AWG	14 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG
3	16 AWG	16 AWG	14 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG		
4	16 AWG	14 AWG	12 AWG	10 AWG	10 AWG	10 AWG				
5	16 AWG	12 AWG	12 AWG	10 AWG						
6	16 AWG	12 AWG	10 AWG	10 AWG						
7	14 AWG	12 AWG	10 AWG							
8	14 AWG	10 AWG	10 AWG							
9	14 AWG	10 AWG								
10	12 AWG	10 AWG								
11	12 AWG	10 AWG								
12	12 AWG	10 AWG								
13	12 AWG									
14	12 AWG									
15	12 AWG									

Notes:

- 1 Copper conductors only.

- 2 The field wiring load depends on the actual load on a particular control circuit the field wiring is connected to. Refer to the internal wiring diagram of the pump package.
- 3 The table above is based on a maximum 10% voltage drop on a 24Vac circuit. Wire size was calculated using the following formula:

$$CM = (25 \times I \times L) / V$$

Where **CM** is circular mils of conductor for a constant load of amps (**I**), wire length (**L**) in feet from the pump package to the field device and back, and voltage drop (**V**).

START UP

BEFORE START UP

- 1 Make a complete visual check of pump package for damages sustained during installation.
- 2 Set all associated electrical switches, controls, thermostats and main disconnect switch to 'OFF' position.
- 3 Check all terminal screws in control panel to make sure they are tight and have the correct torque. Torque values are noted on the individual component. Consult factory if not.
- 4 Check all pipe supports, hangers are complete.
- 5 Visually check all fluid pipe and electrical runs to confirm there is no cross connection of circuits or reversed piping.
- 6 Check that all fluid connections are complete and hooked up after flushing. Lines not being used should have valves closed and plugged or capped.
- 7 Ensure system is full of fluid and air has been purged by standard procedures.
- 8 Confirm all shipping materials have been removed.
- 9 Ensure that control capillary lines do not rub against cabinet or other lines.
- 10 Inspect for leaks. Report any internal pump package leaks to your Engineered Air representative.
- 11 Review the Unit Function (mounted on control panel door) and all control manuals supplied with the equipment.

START UP CHECK LIST

Warning: This unit is connected to high voltages. Electrical shock or death could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. Injury or death could occur if instructions are not followed. All work should be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.



The start-up and operation must be in accordance with safe practices. Start-up must be performed by qualified personnel only.

- 1 Turn disconnect switch ON (control switch is still OFF) and check the supply voltage. Voltage must be within 10% of rating plate. If not, contact the installing electrical contractor and have the voltage condition corrected before continuing start-up.

- 2 Check rotation of all 3 phase motors. Motors were checked for correct rotation at the factory. If rotation is incorrect, turn off disconnect switch and reverse any two power leads leaving the disconnect switch. Re-check rotation.
- 3 Turn on the service switch. Set controls to enable the pump(s).
- 4 Check the amperage draw of each motor. Refer to pump package or motor rating plate for full load amps. At the pump package, check and record the voltage while it is running. For 3 phase power the phase to phase voltage imbalance should be less than 2%. A 2% voltage imbalance can cause up to a 10% current imbalance that will overheat motor windings.

To calculate voltage imbalance (NEMA method) refer to the following example:

Phase to phase voltage reading:	235V 236V 230V
The average voltage between legs is 233.7V	$235 + 236 + 230 / 3 = 233.7V$
Highest voltage deviation from average is:	$233.7 - 230 = 3.7V$
Voltage imbalance % = Highest deviation / average X 100	$3.7 / 233.7 \times 100 = 1.6\%$

This imbalance is less than 2% and therefore is OK.

If voltage imbalance is greater than 2%, turn off main disconnect and contact the installing electrical contractor to have the voltage condition corrected.

- 5 Confirm field wiring voltage drop is less than 10% when equipment is running.
- 6 Allow system to operate until stable running conditions have been established.
- 7 Check pumps for abnormal vibration. If noticeable, do not operate system in this condition.
- 8 Adjust circuit setters as required. Setters are shipped in the fully open position.
- 9 Check and record amperage draw of each motor. Refer to the label for running full load amps of motors.
- 10 Measure and record the suction, discharge and diffuser pressures.
- 11 Set all controls to the settings indicated on the wiring diagram.

Caution:



Do not run pumps without water or glycol.

OPERATION

Warning:



This pump package is connected to high voltages. Electrical shock or death could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. Injury or death could occur if instructions are not followed. All work should be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.

For the pump package to operate properly a system fluid balance must be performed to ensure correct flow.

This pump package may incorporate one or more functions and a variety of controls and options to suit individual requirements. A description of the pump package function and options is shown on the Electrical Data Sheet and pump package wiring diagram. Carefully check your wiring diagram to verify that all remote controls are properly located and correctly field wired.

Some equipment may contain programmable unitary controllers or programmable logic controllers (PLC). Additional information can be obtained from the specific programmable control manufacturer. Often this information is available from the control manufacturer's website.

MAINTENANCE

To provide a maintenance history, it is recommended that the owner have a maintenance file for each pump package. Check and maintain water/fluid quality on a regular basis. A water specialist should regularly test the heat transfer fluid to ensure it is free of any contaminants or sediments and has the proper concentration of inhibitors.

On at least an annual basis:

Check all wiring for loose connections. Tighten to the correct torque if required.

Check voltage at pump package (while in operation).

Check amperage draw against pump package rating plate.

Where possible, all contactors should be inspected to ensure that contacts are clean and are making good contact. If contacts are abnormally pitted or burned badly, replace contactor. Single phasing and motor burnouts can result from bad contacts.

Annually clean and recalibrate all controls, check for proper operation, and repair or replace any faulty controls. Replace blown fuses with equivalent size and type fuse. Failure to do so can result in damage to the pump package.

Caution: Label all wires prior to removal when servicing controls or critical components.



Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.