

**INSTRUCTION MANUAL
INSTALLATION, OPERATION,
AND MAINTENANCE**

B-3724M

ACTUATOR MANIFOLD



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I. GENERAL DESCRIPTION

The B-3724M is an electro-pneumatic Actuator Manifold system designed to operate with Midland's B-3715SW 1" Valve Actuators and the B-3724 Remote Valve Controller. (See "Valve Actuator System" drawing included in the Drawing section.)

The B-3724M provides all the components necessary to open or close the valve actuator in one enclosed assembly. When the actuator is used on a Midland A-713 angle valve or ACF A-1031 angle valve, the Actuator Manifold can report the open or close status of the valve. The manifold also indicates a low inlet supply pressure to assure that the unit has sufficient air pressure to close the angle valves.

The B-3724M is a highly instrumented system which includes an air filter & lubricator, regulator, low air pressure sensor with display, solenoid valves and a flow sensor with display.

The B-3724M Valve Actuator Manifold is a failsafe CLOSE electro-pneumatic system. In the event of a loss of electrical power, the system will provide air to the close port of the actuator to CLOSE the loading/unloading angle valve. In the event of a loss of air, an air reservoir tank must be installed to close the valve. (Contact Midland Manufacturing for more information).

The B-3724 Remote Valve Controller is designed to operate with the B-3724M Valve Actuator Manifold. The B-3724 provides pushbuttons to independently open and close two actuators, open/close valve position indicators, an emergency close pushbutton and a shutdown indicator. It also houses the system electronics which can incorporate customer specific functionality (i.e. remote chlorine sensors to close valve upon chlorine detection, signals from a remote source to close the valve, etc.).

II. SPECIFICATIONS

Gas Supply:	Air or Nitrogen 80 -150 psi -40 °F dew point 12 scfm per actuator
Solenoids:	Valve Select Solenoid (SV-2) – ISO 3 type, 1/2" NPT port, spool-operated valve Latching (last position) 120 VAC, 50-60Hz, 9VA Valve Close Solenoid (SV-4) – ISO 3 type, 1/2" NPT port, spool-operated valve N.O.(energize to close) 120 VAC, 50-60Hz, 9VA Valve Open Solenoid (SV-3) – ISO 3 type, 1/2" NPT port, spool-operated valve N.C.(energize to open) 120 VAC, 50-60Hz, 9VA
Pressure Switch with Display:	Sensing Range: 0-400 psi Max. operating pressure: 1500 psi
Flow Switch with Display:	Sensing Range: 0-44 scfm Max. operating pressure: 232 psi
Wiring Enclosure & Manifold Conduit:	General Location, NEMA 4X

III. **INSTALLATION**

A. General

1. Area Classification NEMA 4X manifold systems are for installation in non-hazardous locations.
2. All piping should be clean and free of debris prior to installing the air manifold. Any chips or filings from threading pipes or other debris can damage components in the air manifold and/or cause the actuator to seize.
3. If teflon tape is used on pipe threads, the last thread on the pipe should be exposed. Thread taped beyond this point can be cut when the pipe is coupled and plug the actuator ports.
4. Field wiring should be installed in accordance with the National Electric Code as well as any applicable local codes.
5. Instrumentation cables approved for NEC Article 725, Class 2 and Class 3 Circuits are recommended.

B. Electrical Connections

1. The B-3715SW Air Actuator switch is wired directly into the terminal strip located in the B-3724M Actuator Manifold.
2. No external power is required. All wiring to the B-3724M Actuator Manifold is connected to the B-3724 Remote Valve Controller.
3. See the attached interconnection wiring diagram for wiring connections.

C. Gas Supply

1. Air or nitrogen can be used as a supply gas to the system.
2. The gas supply must be clean and dry. An external particulate filter and chemical dryer must be used to ensure high quality air. The B-3724M air filter is not intended to be used as the primary filter.

D. Gas Supply Lines To & From Actuator:

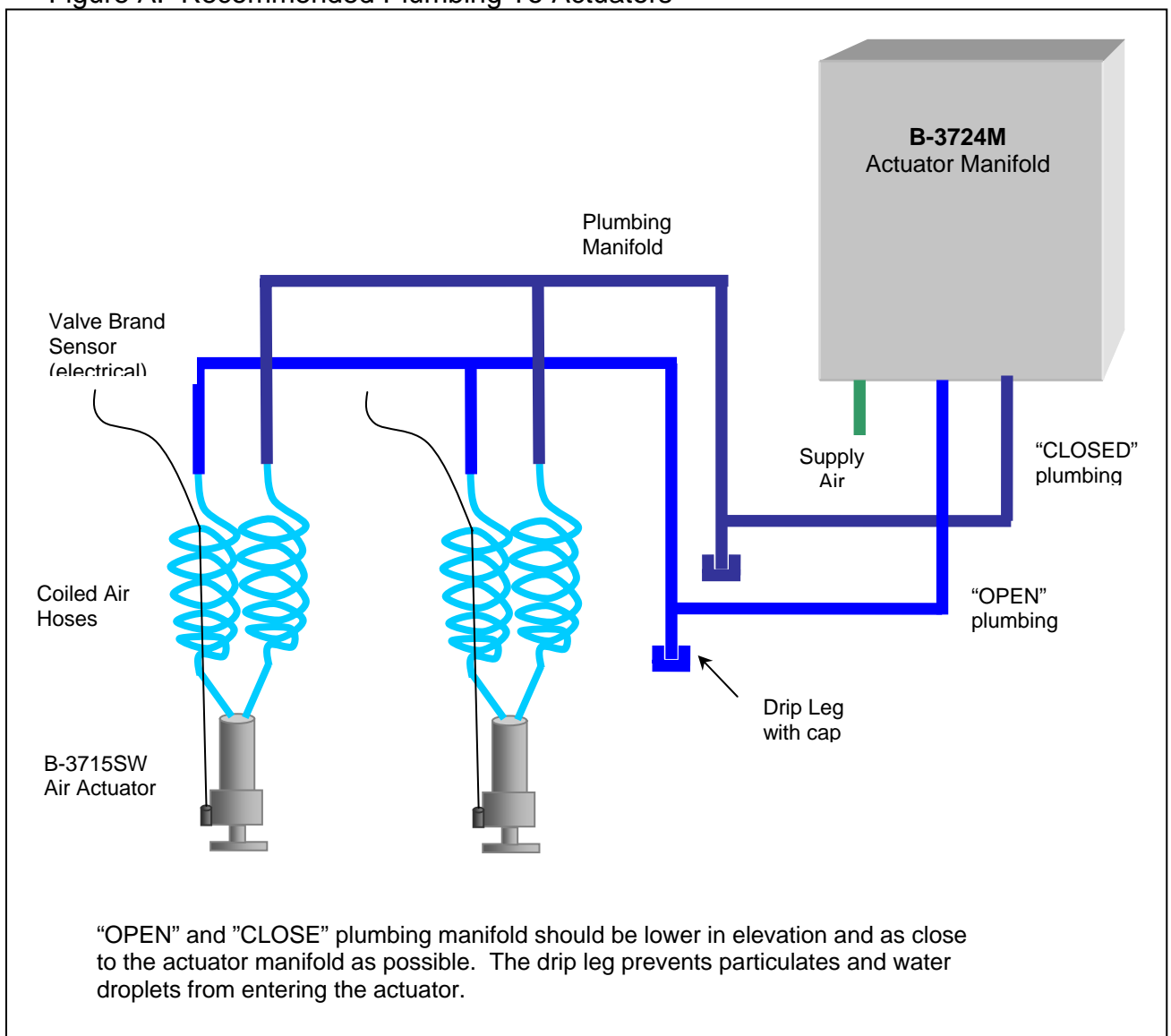
1. There should be no restrictive hose fittings or connections with ports less than 3/8" I.D.

- Guidelines for pipe size to and from the actuator are listed below. These sizes will minimize actuation delay while keeping pressure drop at a minimum.

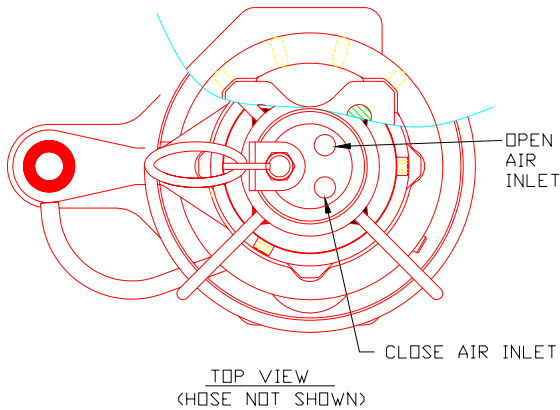
Distance From Manifold To Actuator	Pipe Diameter To Actuator
Less than 50 ft.	3/8"
Between 50 to 100 ft.	1/2" to 3/4"

- See Fig A. below for recommended piping installation to the actuators.

Figure A: Recommended Plumbing To Actuators



4. Connect air hoses to open and close ports on air actuators.



E. Actuator Manifold Instrumentation

1. All pressure switches, flow switch and regulator settings have been factory set per the table below. All settings are based on the number of actuators connected to each manifold.
2. The lubricator provides a fine oil mist to the air lines to lubricate the air motors. A light weight, general purpose machine oil should be used.

Instrument Description	Instrument Designation	Switch Number	Setting for One(1) Actuator	Setting for Two(2) Actuators	Setting for Three(3) Actuators
Pressure Switch	PS-1	SP1	96 psig	96 psig	96 psig
		RP1	90	90	90
	PS-2	SP1	34	34	34
		RP1	32	32	30
		SP2	82	80	76
		RP2	80	78	74
Flow Switch	FS-1	SP1	7.2 scfm	10.4 scfm	13.8 scfm
		RP1	7.0	10.2	13.6
		SP2	13.5	23.6	34.0
		RP2	13.3	23.4	33.8
Pressure Regulator	PRV-1	n/a	42 psig (static)	42psig (static)	42 psig (static)
	PRV-2	n/a	92 (static)	92 (static)	92 (static)
Lubricator	n/a	Adjustment Knob	2 ½ turns open (counter-clockwise)		

SP1 = set point 1
 RP1 = reset point 1

IV. **PRINCIPLE OF OPERATION**

The B3724M Actuator Manifold controls the pressure and direction of air flow through the actuator. The logic to control the manifold is provided by the B-3724 Remote Valve Controller.

The B-3715SW Air Actuator is mounted onto the tank angle valve. The actuator manifold is preset for 2 regulated pressures –

- ❖ a high pressure to operate ACF valves and
- ❖ a low pressure to operate Midland and other low torque valves

When the B-3715SW Air Actuator is mounted onto the angle valve, the actuator reports the valve brand (Midland or ACF), via electrical feedback, to the controller. The controller indicates the valve brand on the panel front and opens solenoid valve SV-2 in the actuator manifold to select the appropriate regulated line pressure to actuate the valve.

No additional adapters or converters are necessary to mount and couple the B-3715SW Actuator to the two major angle valve types (Midland and ACF), however an adapter bracket is required to mount to Eagle brand angle valves.

Pressure indicator/switch P.S.-1 in the actuator manifold provides the low air input signal to the B-3724 controller to initiate shutdown of the valves in the event of a low supply pressure.

Pressure indicator/switch P.S.-2 and flowmeter/switch F.S. -1 in the actuator manifold provides provide feedback to the controller to indicate whether the valve is opened or closed. This instrumentation also provides valuable information during troubleshooting to minimize downtime.

V. SYSTEM OPERATIONAL CHECK

IMPORTANT

The Failsafe Mode Check must be made and established for correct operation of the system.

A. Failsafe Mode Check

1. Remove all actuators from all angle valves. Ensure the actuators are in a located in a stable position that will allow them to operate (i.e. rotate).
2. Turn off power to the B-3724 Remote Valve Controller. This should also turn off power to the B-3724M Actuator Manifold.
3. Open the inlet air ball valve in the B-3724M Actuator Manifold.
4. The actuator coupling should be continuously rotating in a clockwise direction to close the angle valve with a constant air flow. This is the failsafe mode.

If **not**, check:

- i. Air line connections to the actuators. Make sure the open and close lines are connected to the corresponding ports on the air motor.
 - ii. Air hoses for kinks. Make sure there are no kinks in the air hoses.
 - iii. Plumbing from the manifold to actuator. Make sure open and closed plumbing is correct.
5. Once the failsafe mode has been established, close the inlet air ball valve in the B-3724M Actuator Manifold.

CAUTION

Before performing the Operational Check, make sure all process piping connections to and from the tank car have been made and checked per your company's standard operational procedures. All process valves must be closed.

This procedure will open and close the tank angle valves.

Note: It is recommended that the System Operational Check be performed prior to every product transfer to ensure system operation.

B. Operational Check

1. Make sure all tank angle valves are **CLOSED**.
2. Turn on power to the B-3724 Remote Valve Controller. The Shutdown light should be on indicating the controller is in shutdown mode.
3. Open the inlet air ball valve in the B-3724M Actuator Manifold. The actuator(s) should be rotating clockwise. The system will be in the failsafe mode.
4. Press the RESET button on the B-3724 Remote Valve Controller. This should stop the air flow to the actuator(s). The Shutdown light on the control panel should be off.
5. Mount the actuator(s) on the angle valves.
6. Press the valve open button on the B-3724 Remote Valve Controller. The actuator(s) should rotate to open the angle valve(s).
 - a) The actuator(s) should rotate counter-clockwise.
 - b) VALVE OPEN light should be on.
7. Press the valve close button on the B-3724 Remote Valve Controller. The actuator(s) should rotate to close the angle valve(s).
 - a) The actuator(s) should rotate clockwise.
 - b) When the valve is fully closed, the VALVE CLOSED light should turn on.
8. Press emergency close button on the B-3724 Remote Valve Controller. This will place the system in the failsafe mode.
 - a) The actuator should rotate clockwise.
 - b) The Shutdown light should be on.
 - c) When the valve is fully closed, the VALVE CLOSED light should turn on.
 - d) There should be a continuous flow of air to the actuator(s).

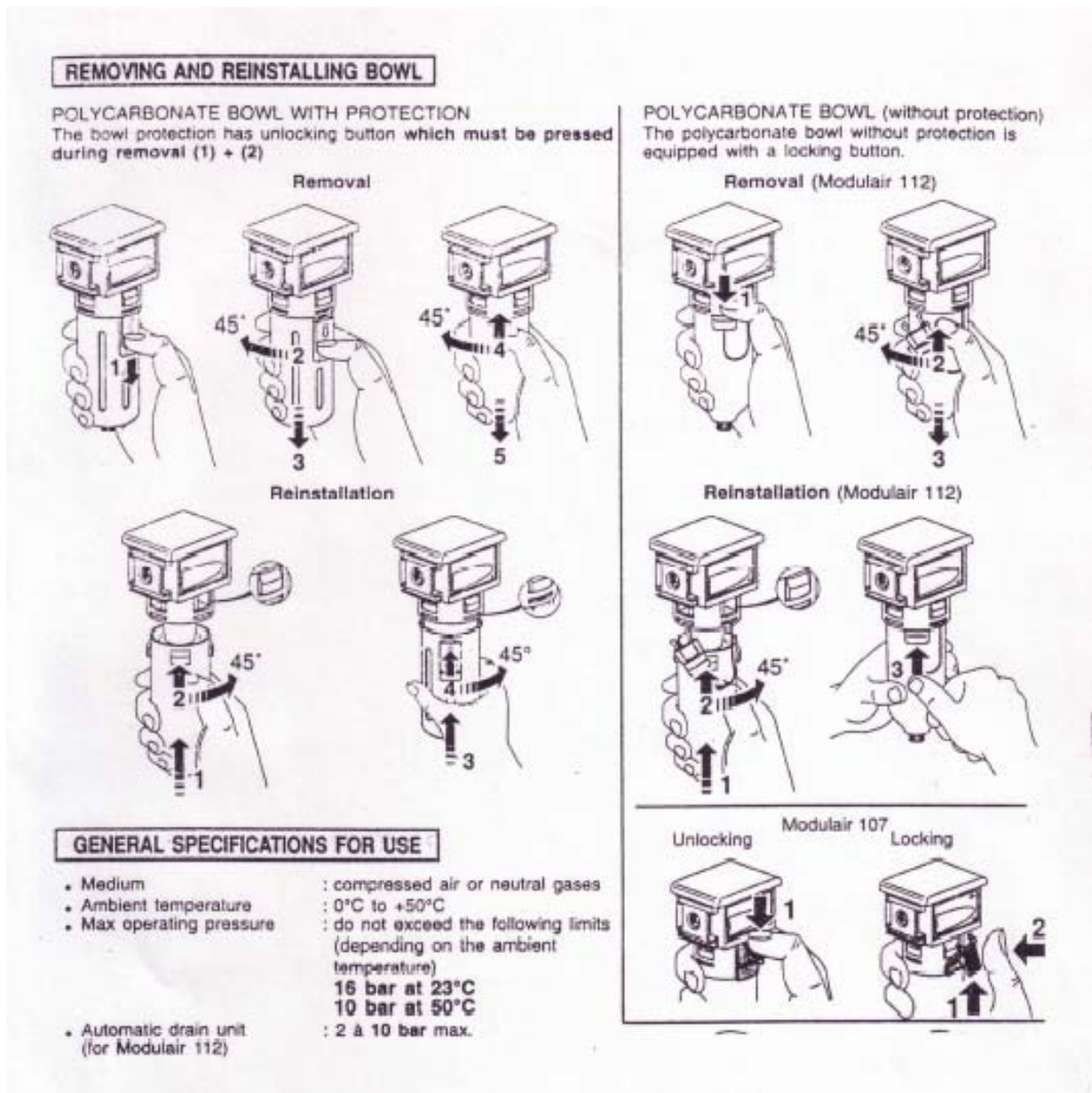
9. Press the Reset button on the B-3724 Remote Valve Controller.
 - a) The Shutdown light should be off.
 - b) Air flow to the actuator(s) should be stopped.
10. The system is now ready for operation.

MAINTENANCE PROCEDURES

A. Checking The Lubricator

A lubricator is provided in the B-3724M Actuator Manifold to provide a mist of oil in the air supply to the actuators. The oil is necessary to keep the actuators lubricated.

1. Check the lubricator bowl to ensure that it is filled with oil. It should be filled about $\frac{3}{4}$ full with a lightweight, general purpose machine oil. See the instructions below to remove and reinstall the bowl protector and bowl.



2. The lubrication setting (rate) has been factory set. No further adjustment should be required. The factory setting provides approximately 1 drop of oil every 15-25 seconds during air flow.

3. If the lubrication rate must be adjusted, follow the directions below.

LUBRICATOR

INSTALLATION

- To be placed after filter, filter/regulator near point of use
- Position vertically (maximum inclination 5°)
- Pressure and temperature: see general specifications
- Visual oil level check:
 - Through transparent bowl (polycarbonate bowl version)
 - Through large windows in bowl protection

FILLING OF BOWL

- Modulair 107: lubricator depressurized (pressurized on request)
- Modulair 112: lubricator depressurized or pressurized, after unscrewing the upper plug (A)

• **Types of oil:** Non-detergent oil without aggressive additives, VG 32 class (ISO 3448) Viscosity: 29 to 35 cSt (mm²/s) at 40°C

OIL FLOW RATE ADJUSTMENT

- Adjustment by means of knob (B) with "pull-turn-push" type locking system (fig.1), or by means of a 6 mm Allen key after having first unblocked the adjustment knob (pull B) (fig.2). Flow direction indicated by arrows.
- Set oil flow rate during the passage of air
- Start point: below 20 l/min (STP)
- Oil flow rate: arg one drop of oil per minute for an air flow of 300 l/min (STP)
- 360° oil flow sight glass (C)

MAINTENANCE

- Replenish oil whenever necessary
- Cleaning of bowl: as the bowls (with or without protection) are of polycarbonate (PC) never use a solvent ,use an alkaline solution (soapy water)

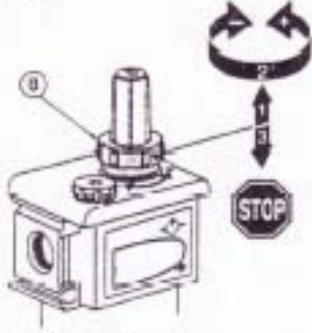


Fig. 1

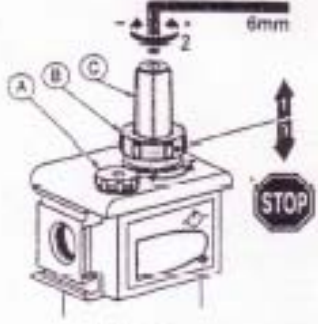
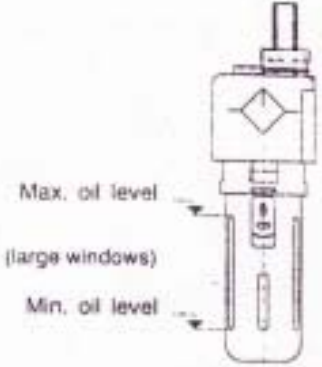


Fig. 2



B. Lubricating the Actuator

In order to maintain trouble free operation of the air motors, they must be lubricated. The following procedure will ensure that the motors receive adequate lubrication.

1. With the actuators not mounted on valves (i.e. the actuators are free to rotate), hold down the close button on the B-3724 Remote Valve Controller for approximately 1 minute. This will ensure adequate lubrication to the actuator(s).
2. Perform this procedure at least once per week.

C. Checking the Air Filter

The filter should be checked periodically and all debris and water should be removed from the bowl. See instructions below to remove and replace the bowl.

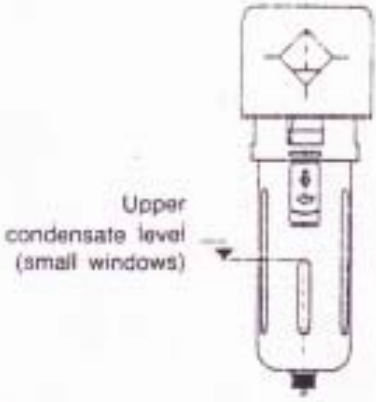
FILTER

INSTALLATION

- Place near point of use, after isolation valve
- Position vertically (maximum inclination 5°)
- Pressure and temperature: see general specifications
- Visual condensate level check:
 - through transparent bowl (polycarbonate bowl version)
 - through small window in front of bowl protection
- Depending on the version selected: the filter is equipped with:
 - A semi-automatic drain (G 1/8 connection)
 - Drain closes on bowl pressurization
 - Opens when depressurized
 - Can be operated manually by pressing plunger when bowl is under pressure
 - Automatic drain - operating pressure 2 to 10 bar (for Modulair 112) (nipple connection for Ø 6 ID hose)
 - Drain opens by built-in float when maximum condensate level is reached
 - Recloses after discharging condensates
 - Can be operated manually (knurled knob)
 - Manual drain

MAINTENANCE

- Bowls (with or without guard) of polycarbonate (PC):
never use a solvent, use an alkaline solution (soapy water) for cleaning.
- Filtering element: replace if clogged (available as spare part)
- Filtering capacity indicated by colour coding: white for 5µm, red for 10µm, yellow (standard) for 25µm, and green for 50µm



Upper condensate level (small windows)

D. Troubleshooting

System maintenance and repairs should be performed by an experienced electrician. For further technical support, contact Midland.

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Actuator does not open valve.	<p>AC power is not applied to "open" solenoid. ("Close" solenoid, SV-4, should also be energized.)</p> <p>Solenoid bad.</p> <p>Valve "over-torqued" when closed.</p>	<p>Check control system and wiring. Verify that 110 VAC is applied to "open" solenoid, SV-3.</p> <p>Replace solenoid.</p> <p>Manually turn valve toward open position.</p>
Actuator does not close valve.	<p>AC power is not applied to "close" solenoid. ("Open" solenoid, SV-3, should be de-energized.)</p> <p>Solenoid bad.</p> <p>Valve "over-torqued" when opened.</p>	<p>Check control system and wiring. Verify that 110 VAC is applied to "close" solenoid.</p> <p>Replace solenoid.</p> <p>Manually turn valve toward close position.</p>
Valve closed but no "closed" indication.	Air flow or pressure has changed Preset set points have not been reached due to the change in supply pressure.	Increase regulator pressure. If there is a "closed" indication problem when on an ACF valve, adjust pressure regulator PRV-2. If there is a "closed" indication problem when on a Midland valve, adjust pressure regulator PRV-1.
Actuator manifold does not switch between high & low pressure lines when the actuator is mounted on different valve types.	<p>Actuator not properly mounted onto valve.</p> <p>Valve brand sensor malfunction.</p>	<p>Ensure actuator is properly mounted on valve. For ACF valves, ensure coupling pins are in the holes of the handwheel.</p> <p>Replace valve brand sensor.</p>

VI. DRAWINGS

<u>Drawing Number</u>	<u>Description</u>
3724(0)0J	Valve Actuator System
B-3724M	B-3724M Manifold Assembly (1 of 2)
B-3724M	B-3724M Manifold Assembly (2 of 2)
37*4M(0)0F	B-37*4M Wiring Diagram

VII. SPARE PARTS INFORMATION

In the event of a failure, the following parts should be stocked at the job site for minimum downtime.

<u>Quantity</u>	<u>Part number</u>	<u>Description</u>
1	Midland 3724M-39	Open/Close Solenoid Valve
1	Midland 3724M-30	Pressure Regulator with Gauge
2	Midland 3715-32	Proximity Switch Assembly (located on actuator)

VIII. WARRANTY POLICY

STANDARD WARRANTY

Midland Manufacturing Corp. warrants that its products shall be free from defects in workmanship and materials, and shall conform to Midland Manufacturing Corp.'s published specifications, or other specifications accepted in writing, for a period of one (1) year after the product is placed into service, but no later than eighteen (18) months from the date of Midland Manufacturing Corp. shipment. Claims must be entered prior to the above dates.

LIMITS OF WARRANTY LIABILITY

This warranty does not apply to any products which have been subject to misuse, neglect, accident, modification, or otherwise installed outside the original application for which the Purchase of equipment was specified and intended. Midland Manufacturing Corp.'s sole obligation under its warranty shall be to repair, or supply a replacement for, the part, component or product, or issue credit at its sole discretion. Midland Manufacturing Corp.'s warranties and remedies are exclusive and are made expressly in lieu of all other warranties expressed or implied, either in fact or by operation of law, statutory or otherwise, including warranties of merchantability and fitness for use. Midland Manufacturing Corp. shall not be liable for damages due to delays in deliveries or use and shall in no event be liable for incidental or consequential damages of any kind, whether arising from contract, tort, or negligence, including but not limited to loss or profits, loss of customers, loss of goodwill, overhead or other like damages.