



DOT 3-WAY CONTROL VALVE

TABLE OF CONTENTS

INSTALLATION.....	4
VALVE POSITION	4
PROBLEM PREVENTING PROCEDURES	4
OPERATION	4
MAINTENANCE OF VALVE BODY SUB-ASSEMBLIES.....	5
DISMANTLING THE DOT 3-WAY CONTROL VALVE.....	5
CLEANING-REPLACING PARTS	5
ACTUATOR MAINTENANCE REPLACING DIAPHRAGMS, ETC.	5
GENERAL – FOR DIRECT AND REVERSE ACTING ACTUATORS.....	5
DIRECT ACTING	6
DISMANTLING SIZES 35, 55, 55A, 85.....	6
REASSEMBLY.....	6
REVERSE ACTING	6
DISMANTLING SIZES 35R, 55R, 55AR, 85R (See Figure 5)	6
REASSEMBLY.....	6
PRE-SETTING STEM SEAL – (55R AND 85R).....	6
PRE-SETTING STEM SEAL – (35R).....	6
MOUNTING ACTUATOR TO MAIN BODY.....	6
TO CHANGE VALVE ACTION FROM NORMALLY OPEN TO NORMALLY CLOSED OR VICE- VERSA.....	8
PROCEDURE.....	8
CONTROL VALVE REASSEMBLY AND ADJUSTMENT.....	8
REASSEMBLY (SIZES 1” – 2”)	8
HOW TO MAKE PRELOAD ADJUSTMENT	8
HOW TO ADJUST CONTROL VALVE FOR RATED TRAVEL AND POSITIVE COMPRESSION FORCE.....	8
CONTROL VALVES WITH DIRECT ACTING ACTUATORS.....	9
CONTROL VALVE WITH REVERSE ACTING ACTUATORS (AIR PRESSURE MOVES VALVE PLUG STEM UPWARD.)	9
SHORT VALVE TRAVEL.....	9

ILLUSTRATION INDEX

FIGURE 1 – CONVERGING OR MIXING SERVICE.....	4
FIGURE 2 – DIVERGING SERVICE.....	4
FIGURE 3 – DOUBLE PORTED CONTROL VALVE.....	5
FIGURE 4 – 55 & 55A ACTUATORS.....	7
FIGURE 5 – 55R (AR) & 85R (AR) ACTUATORS.....	7

INTRODUCTION

This Installation, Operation, and Maintenance Manual is intended to be as complete and up to date as possible. It covers installation, operation, and maintenance procedures for Leslie Controls, Inc. DOT 3-Way Control Valve. Leslie reserves right to update this manual and other product information concerning installation, operation, and/or maintenance, at any time and without obligation to notify product owners of such changes.

Leslie is not responsible for injury to personnel or product damage due to improper installation, operation, and/or maintenance. Leslie Controls, Inc. Back Pressure Regulators. All installation, operation, and maintenance procedures should only be performed by trained/certified personnel. All personnel performing these procedures should completely and carefully read and understand all supplied materials before attempting procedures. All personnel should pay strict attention to all Notes, Cautions, and Warnings that appear within procedures detailed in this manual.

Leslie welcomes user input as to suggestions for product or manual improvement.

Contact Information

For information concerning warranties, or for questions pertaining to installation,

Operation or maintenance of LESLIE products, contact:

LESLIE CONTROLS INC.
12501 Telecom Drive
Tampa, FL 33637

USA Phone: (813) 978-1000
USA Fax: (813) 978-0984
www.LESLIECONTROLS.com

To order replacement parts, contact LESLIE CONTROLS at address listed above, or call toll free:

USA/Canada/Caribbean Phone: (800) 323-8366

Note: Please include model and serial number of unit for which parts are being ordered. If ordering by phone, please have this information readily available.

GENERAL NOTES AND WARNINGS

Notes:

- If questions are not answered by this manual, or if specific installation, operation, and/or maintenance procedures are not clearly understood, contact Leslie Controls, Inc. for clarification before proceeding.
- If unit is damaged during installation, operation, or maintenance, complete following steps:
 1. Turn off and lock out pneumatic supply to unit in an approved manner.
 2. Turn off all incoming valves.
 3. Contact in-house maintenance personnel or Leslie Controls, Inc. for instructions.

Note: Throughout this manual, warnings will be denoted by BOXES

CAUTION!

Piping system must be adequately designed and supported to prevent extraordinary loads to pressure equipment.

It is strongly recommended that this document be reviewed before attempting any installation, operation, or maintenance procedures.

INSTALLATION

VALVE POSITION

Install control valve in an accessible location. Connect supply and outlet pipe lines to valve as described below. Control valve may be placed in any position but upright is preferable for ease of maintenance. Connect operating medium tubing from control pilot, instrument or loading device to diaphragm chamber connection of control valve or to valve positioner if one is in use.

PROBLEM PREVENTING PROCEDURES

- Provide removal space above, below and around control valve for easy removal of parts during maintenance.
- Blow or flush out pipe lines thoroughly before installing control valve.
- Protect control valve and following equipment with a Self-Cleaning Strainer.
- Install stop valves and gauges in inlet and outlet lines to provide means for checking equipment.

- Adhere to good piping practice.

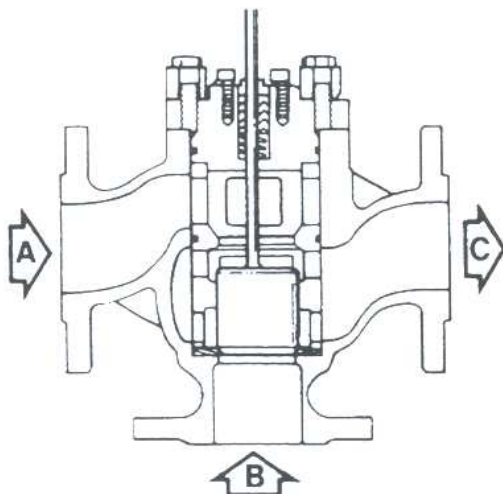
OPERATION

See Leslie application guide for other operating instructions.

- Close inlet and outlet stop valves.
- Check that control valve responds properly through rated travel in relation to changes in operating pressure on the diaphragm. Rated travel is shown by position of travel indicator disc on valve stem relative to travel indicator scale on yoke.
- Manually operate control valves fitted with manual operating devices through rated travel to check freedom of movement.
- Place control valve in operation in accordance with instructions furnished with control pilot or other operating device.

In converging service (mixing) two fluids are mixed to produce a third fluid. The valve has two inlet connections (marked "A" and "B") and one outlet connection (marked "C").

Connect supply lines to "A" and "B" connections and outlet to "C" connection. See figure 1.

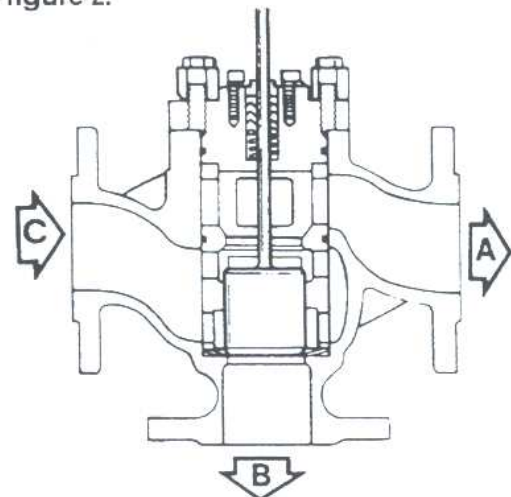


CONVERGING OR MIXING SERVICE

FIGURE 1

In diverging service the valve has one inlet supply connection (marked "C") and two outlet connections (marked "A" and "B").

Connect supply line to "C" connection and outlet lines to "A" and "B" connections. See figure 2.



DIVERGING SERVICE

FIGURE 2

MAINTENANCE OF VALVE BODY SUB-ASSEMBLIES

1. DISMANTLING THE DOT 3-WAY CONTROL VALVE

- a. Loosen stem nut. Unscrew the valve plug stem from the actuator stem. (In large valves, support the valve plug stem to prevent the valve plug from suddenly falling downward when the stem clears. Loosen and remove the yoke capscrews. Lift the actuator from the bonnet.)
- b. Lift the valve stem carefully and pull upwards until the bonnet and cage come out of the main body. Remove both "O" rings and lift the load ring out of the main body. Remove main valve from cage.
- c. Loosen the two set screws and remove the bonnet from the cage.
- d. Remove the packing screws from the packing flange. Remove the packing follower, packing, packing washer and packing spring.

2. CLEANING-REPLACING PARTS

Clean all parts thoroughly, including the packing box. Use an approved, non-residue forming solvent. To remove encrusted materials use crocus or a very mild aluminum oxide cloth. Examine all parts. Replace any badly worn or damaged part.

ACTUATOR MAINTENANCE REPLACING DIAPHRAGMS, ETC.

GENERAL – FOR DIRECT AND REVERSE ACTING ACTUATORS

Remove Compression on actuator spring by screwing spring adjustor counterclockwise until actuator spring is free.

NOTE: Count the number of turns to relax spring compression. Return to the same setting when assembling.

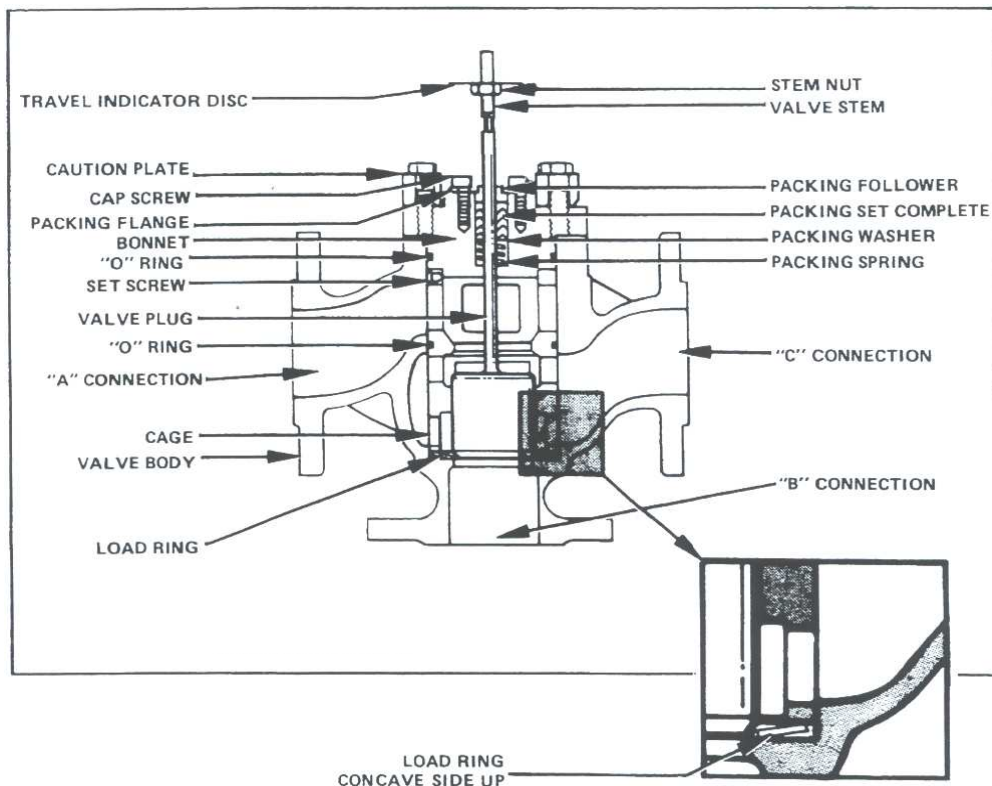


Figure 3 – Double Ported Control Valve (Single Disc Design)

1. DIRECT ACTING

DISMANTLING SIZES 35, 55, 55A, 85

Remove bolts/nuts, upper diaphragm case and old diaphragm.

To examine, clean or replace other internal components lift out diaphragm plate assembled with actuator stem, actuator spring, washer and unscrew spring adjustor from adjustor sleeve.

REASSEMBLY

Replace internal parts. Install new diaphragm. In sizes 35, 55, 55A and 85 line up holes with those in lower diaphragm case. Replace upper diaphragm case on diaphragm. Assemble four bolts and nuts through parts (90° apart). Fingertighten. Assemble balance of bolts/nuts to actuator. Tighten evenly and alternately across diaphragm case. (Before tightening bolts in 35 actuators or where flat stock diaphragm material is used in other sizes as an emergency measure) consult note relating to performing actuator diaphragm.

2. REVERSE ACTING

DISMANTLING SIZES 35R, 55R, 55AR, 85R (See Figure 5)

Remove bolts/nuts and upper diaphragm case. Insert rod through holes in yoke and actuator stem to prevent twisting of stem seal when removing self-locking nut. (In size 35R use wrench on flats on actuator stem) Remove self-locking nut, stem seal. Remove stem seal as follows: In 35R remove stud nuts and disassemble lower diaphragm base from yoke. Lift out stem seal. In 55R and 85R DO NOT remove lower diaphragm base unless gasket is to be replaced. Stem seal is held in place by seal ring and screws. Take out these parts and lift out stem seal.

NOTE: To check actuator spring and other components. In 35R, 55R and 85R parts are taken out from the underside.

REASSEMBLY

Reassemble spring adjustor, washer, actuator spring, and top spring seat to actuator stem (if they have been removed.) Replace assembled parts in yoke. Place stem seal collar on actuator stem. Position stem seal on stem collar. In sizes 55R and 85R place bead of stem seal in recess of stem seal collar.

In 35R reassemble lower diaphragm base to yoke. Insert capscrews through holes in lower diaphragm case and

diaphragm and into threads in yoke. Tighten after resetting stem seal as described below.

In 55R and 85R actuators replace sealing ring and screws. Tighten.

PRE-SETTING STEM SEAL – (55R AND 85R)

Place collar on stem seal, making sure that bead on stem seal enters recess in collar. Reassemble diaphragm over actuator stem. Fit center hole in diaphragm around raised face of collar. Replace diaphragm plate and self locking nut. Hold actuator stem steady with rod through yoke and stem (35R) then tighten self-locking nut. Replace upper diaphragm case and bolts/nuts. Tighten as described previously.

PRE-SETTING STEM SEAL – (35R)

Place collar on stem seal, assemble self-locking nut to actuator stem and tighten down against parts. Then press actuator stem downward to make stem seal move to taut position. Tighten capscrews and remove self-locking nut.

3. MOUNTING ACTUATOR TO MAIN BODY

Set preload on actuator spring, reassemble actuator to valve body assembly, if it had been removed, adjust valve for rated travel and reconnect operating medium tubing.

SOME IMPORTANT NOTES

FLAT SHEET RUBBER MATERIAL

Flat sheet rubber materials may be used in 55(R) and 85(R) actuators as emergency replacement material, but for guaranteed results it should be replaced at the earliest opportunity with the Leslie Rolling Action Diaphragm designed specifically for these actuators. When flat material is used in emergency perform as described below.

PERFORMING 35(R) ACTUATOR DIAPHRAGMS

Flat stock material is used for diaphragms in 35(R) actuators. When assembling first fingertighten all diaphragm case bolts. Then compress actuator spring sufficiently to move diaphragm through full travel to upper or lower diaphragm case depending on whether actuator is direct or reverse acting. This performs diaphragm and permits full movement through rated travel without resistance from a taut diaphragm.

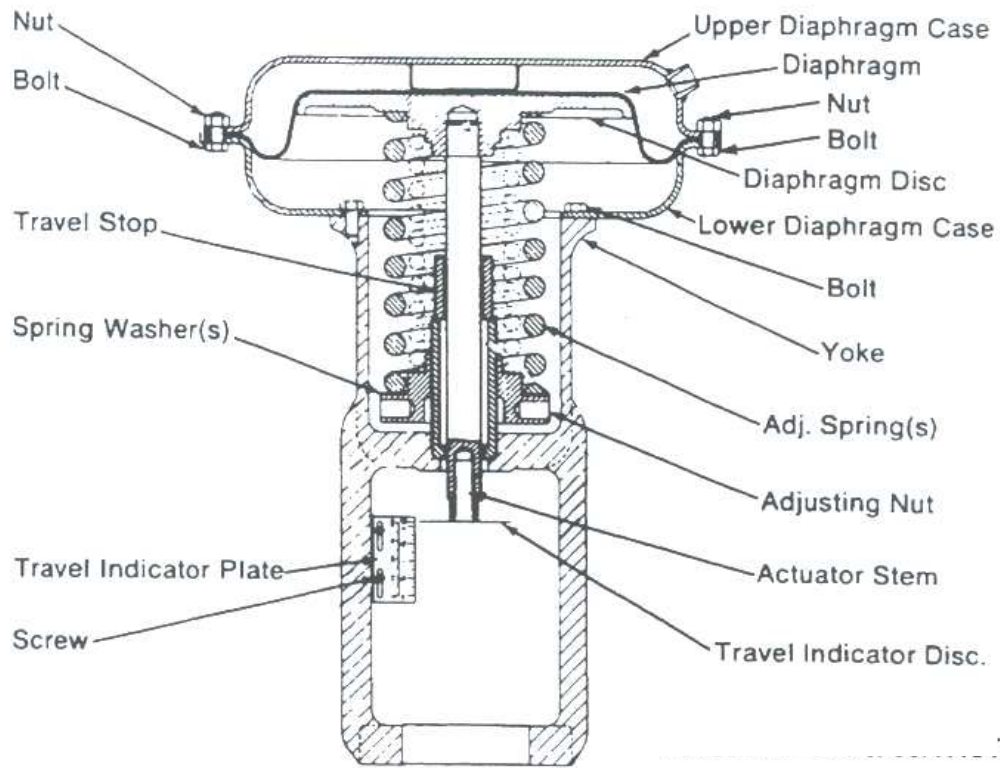


Figure 4 - 55 & 55A ACTUATORS

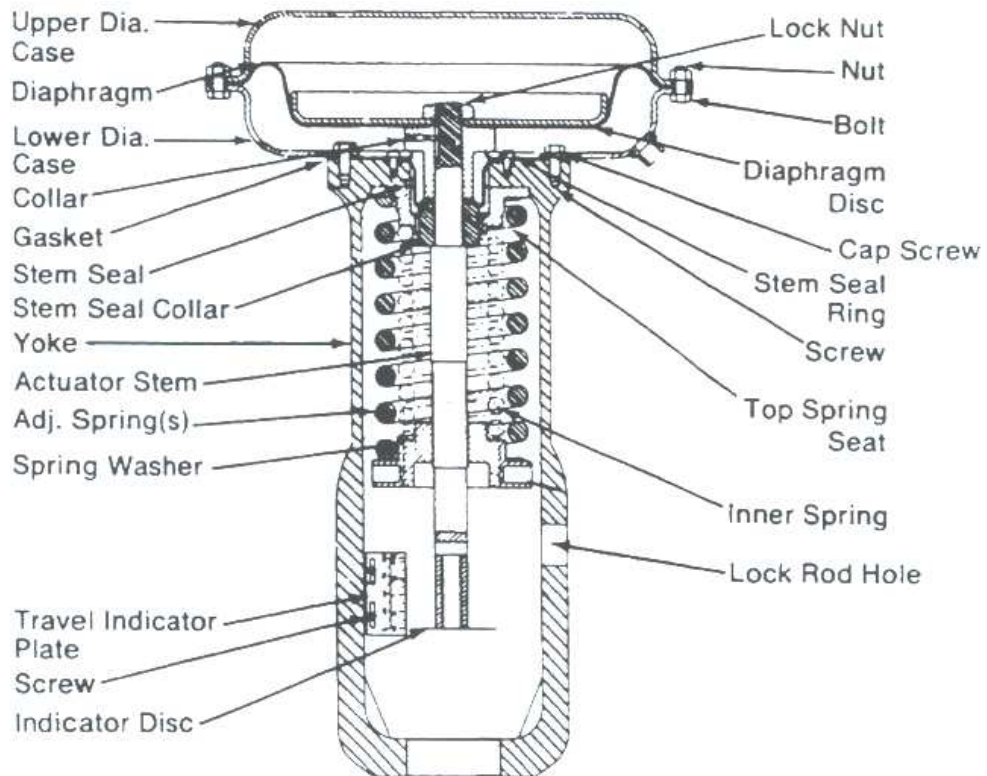


Figure 5 - 55R (AR) & 85R (AR) ACTUATORS

4. TO CHANGE VALVE ACTION FROM NORMALLY OPEN TO NORMALLY CLOSED OR VICE-VERSA

To reverse the action of a single ported diaphragm control valve it is only necessary to replace the actuator in use with one having the opposite action. A single "D" in the control valve class indicates actuator is "DIRECT ACTING" – Air moves diaphragm downward. A double D ("DD") indicates actuator is "REVERSE ACTING" – Air moves diaphragm upward.

PROCEDURE

To change actuator, loosen valve plug stem locknut under travel indicator and turn valve plug stem all the way out of the actuator stem. Remove capscrews securing actuator to bonnet. Replace actuator with one having desired action. Re-insert and tighten actuator spring preload and set valve for rated travel.

CONTROL VALVE REASSEMBLY AND ADJUSTMENT

1. REASSEMBLY (SIZES 1" – 2")

- a. Install the bonnet into the cage and tighten the two set screws.
- b. Insert the main valve up through cage and bonnet.
- c. Insert the packing spring and packing washer onto the bonnet.
- d. Install new set of packing in the order in which they are packed.
- e. Install the packing follower, then install the packing flange.
- f. Insert cap screws through the packing flange and hand tighten.
- g. Lubricate "O" Rings and install on bonnet and cage.
- h. Insert the load ring into the bottom of the main body. Be sure to replace in a concave manner. (See diagram)

- i. Insert main valve, cage and bonnet of the main body. (Be careful not to damage the "O" rings.)
- j. Position actuator on bonnet. Insert the capscrews through the yoke and into threads in the bonnet. Tighten capscrews firmly.
- k. Lift the valve plug stem and engage its threads with those of the actuator stem. Screw into actuator stem one to two diameters. Then adjust the control valve for starting pressure preload, rated travel and positive compression force.

2. HOW TO MAKE PRELOAD ADJUSTMENT

- a. Connect controlled air line to diaphragm case connection at "A".
- b. Supply 3 psig air pressure to actuator diaphragm.
- c. Compress actuator spring until travel indicator begins to move when air pressure is 3 to 4 psig.

NOTE: The valve travel should be checked under actual operating conditions for rated travel. If the stem travel is less than full, some additional spring compression will be required.

- d. To compress spring, screw-adjusting nut upward on both reverse and direct acting actuators.

3. HOW TO ADJUST CONTROL VALVE FOR RATED TRAVEL AND POSITIVE COMPRESSION FORCE

In all cases full valve travel is mechanically predetermined by the distance between seats valves must be adjusted to make full contact with seat in either direction.

In direct acting actuators spring force brings valve plug in contact with upper seat, air force with lower.

In reverse acting actuators air force brings valve plug in contact with upper seat, spring force with lower.

In reverse acting actuators air force brings valve plug in contact with upper seat, spring force with lower.

4. CONTROL VALVES WITH DIRECT ACTING ACTUATORS (AIR PRESSURE MOVES VALVE PLUG STEM DOWNWARD.)

- a. Screw valve plug stem upward into actuator stem until valve plug contacts upper seat.
- b. Connect air line to actuator. Supply sufficient air pressure to move valve plug slightly away from seat.
- c. Then turn valve plug stem one full turn further into actuator stem to make positive compression contact of valve plug with upper seat at rated travel.
- d. Tighten stem nut and travel indicator against actuator stem. Tighten package flange bolts.

5. CONTROL VALVE WITH REVERSE ACTING ACTUATORS (AIR PRESSURE MOVES VALVE PLUG STEM UPWARD.)

- a. Screw valve plug stem upward into actuator stem approximately one diameter (thickness of stem.)
- b. Connect air line to actuator. Supply 20 psig air pressure to actuator diaphragm to move actuator through full travel.

- c. Turn valve plug stem upward into actuator stem until valve plug contacts upper seat.
- d. Reduce air pressure on diaphragm to permit valve plug to move slightly off seat.
- e. Then turn valve plug stem one full turn further into actuator stem to make positive compression contact with upper seat at rated travel.
- f. Tighten stem nut and travel indicator against actuator stem. Tighten packing flange bolts.

6. SHORT VALVE TRAVEL

If valve travel is too short when required maximum air pressure is supplied to actuator diaphragm, incorrect adjustment is indicated. To correct, loosen stem nut and turn valve plug stem out of actuator stem amount necessary to obtain full travel. Travel indicator on yoke shows full travel. Recheck positive compression force then tighten stem nut.

NOTE: In 2 1/2" and larger bronze valve ONLY, the bonnet is of a two piece construction. Be sure to replace the caution plate (1"-2" valves) before mounting the actuator.



It is solely responsibility of system designer and user to select products and materials suitable for their specific application requirements and to ensure proper installation, operation and maintenance of these products. Assistance shall be afforded with selection of materials based on technical information supplied to Leslie Controls Inc.; however, system designer and user retain final responsibility. Designer should consider applicable Codes, material compatibility, product ratings and application details in selection and application. Improper selection, application or use of products described herein can cause personal injury or property damage. If designer or user intends to use product for an application or use other than originally specified, he must reconfirm tat selection is suitable for new operating conditions. Life expectancy for this product defaults to warranty period of sales contract.