

BI-TORQ PN-SERIES OPERATION AND SELECTION GUIDE

DOUBLE ACTING ACTUATORS

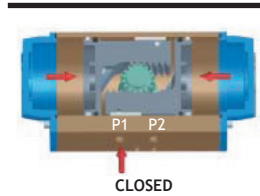
ACTUATOR OVERVIEW

- All listed output torques are expressed in inch pounds of torque (in. lbs.).
- Charts for available air pressure are expressed in pounds per square inch (P.S.I.).
- BI-TORQ® actuators offer $\pm 5^\circ$ adjustment in the open and closed positions on PN-52 through PN-125 models. For all other models, adjustment is in the open position only. The closed position is 0° fixed. Optional retrofit kits are available to allow for adjustment in both open and closed positions on the PN-160, PN-200 and PN-270 models.

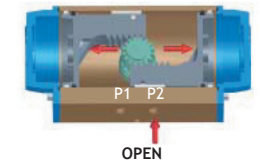
DOUBLE ACTING ACTUATOR SIZING (PLEASE SEE DOUBLE ACTING TORQUE CHART)

1. Establish the valve manufacturer's breakaway or seating/unseating torque, then add 20% as a safety factor (e.g. 115 in. lbs. valve breakaway torque x 20% = 138 in. lbs.).
2. Determine available air pressure to the actuator (e.g. 60 P.S.I.).
3. Refer to the chart, find the 60 P.S.I. column and scan down until a torque value greater than the valve torque is found (e.g. 141 in. lbs.). Then go to the left to determine the BI-TORQ® model number. In this sample case, the selected actuator would be the PN-52DA.

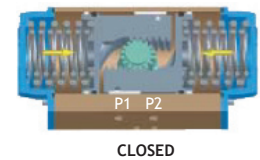
NOTE: The BI-TORQ® double acting actuator has no torque drop through the full 90° stroke.



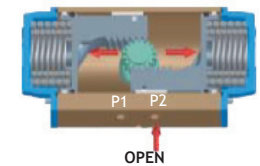
CLOSED
Air to Port 1 (P1) forces the pistons inwards, causing the pinion to turn clockwise.



OPEN
Air to Port 2 (P2) forces the pistons outwards, causing the pinion to turn counterclockwise.



CLOSED
Loss of air pressure on Port 2 causes springs to drive the pistons inward. The pinion turns clockwise to close while air exhausts from Port 2.



OPEN
Air to Port 2 (P2) forces the pistons outwards, causing the springs to compress. The pinion turns counterclockwise.

SPRING RETURN ACTUATORS

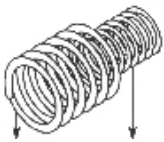
SPRING RETURN ACTUATOR TERMINOLOGY

1. **AIR STROKE:** When air is supplied to the actuator, the pistons compress the springs. The greater the spring compression, the less torque output the actuator can supply.
2. **SPRING STROKE:** When air is removed from the actuator, the stored energy in the springs forces the pistons inward. At full compression, the spring is at its maximum torque output. This is the **SPRING START**. When springs are uncompressed, this is the **SPRING END**.
3. **FAIL POSITION:** Standard BI-TORQ® actuators are preset for fail closed (CW) operation, but can be adjusted easily for fail open (CCW) rotation.

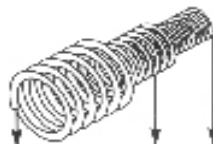
SPRING RETURN ACTUATOR SIZING (PLEASE SEE SPRING RETURN TORQUE CHART)

1. Establish the valve manufacturer's seating torque (closing) and breakaway torque (opening). Add a 20% safety factor (e.g. a valve torque of 80 in. lbs. x 20% = 96 in. lbs.).
2. Refer to the spring torque column and select the **SPRING END TORQUE** that equals or exceeds the required valve torque (i.e. the BI-TORQ® model PN-63 with a 80# spring set, which has a **spring end** of 111 in. lbs. and a **spring start** of 196 in. lbs.).
3. Determine the available air line pressure to the actuator (e.g. 80 P.S.I.). Refer to the 80 P.S.I. column and scan down to where it intersects with the PN-63 with an 80# spring. In this case, the end spring torque is 111 in. lbs., which exceeds the required 96 in. lbs. required.

SPRING SET COMBINATION OPTIONS



| PN-52SR TO PN-140SR | | | |
|---------------------|-----------------|------------|-------|
| EXTERNAL SPRING | INTERNAL SPRING | AIR SUPPLY | SET # |
| 1 | 1 | 40PSI | 01 |
| 2 | X | 50PSI | 02 |
| 1 | 2 | 60PSI | 03 |
| 2 | 1 | 70PSI | 04 |
| 2 | 2 | 80PSI | 05 |



| PN-160SR AND PN-200SR | | | | |
|-----------------------|----------------|-----------------|------------|-------|
| EXTERNAL SPRING | CENTRAL SPRING | INTERNAL SPRING | AIR SUPPLY | SET # |
| X | 2 | X | 40PSI | 01 |
| 2 | X | X | 50PSI | 02 |
| 1 | 2 | X | 60PSI | 03 |
| 2 | X | 2 | 70PSI | 04 |
| 2 | 2 | X | 80PSI | 05 |
| 2 | 2 | 2 | 100PSI | 06 |



| PN-270SR | | |
|------------------|------------|-------|
| SPRINGS PER SIDE | AIR SUPPLY | SET # |
| 2/3 | 40PSI | 01 |
| 3/3 | 50PSI | 02 |
| 3/4 | 60PSI | 03 |
| 4/4 | 70PSI | 04 |
| 4/5 | 80PSI | 05 |
| 5/5 | 100PSI | 06 |
| 5/6 | 110PSI | 07 |
| 6/6 | 120PSI | 08 |