ITT HAMMEL DAHL CONOFLOW

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Instructions and Parts List

HDC 13021-6
Piston Actuators
B-50 Series
Effective 5/1/77

INSTRUCTIONS
B-50 Series Cylinder Actuator

General

The series B-50 pneumatic cylinder actuator is designed for precise throttling control of processing equipment. The series B-50 actuator has high power output and excellent sensitivity. It is compact and adaptable to many different services. *These instructions should be read carefully before placing the actuator in service.*

The series B-50 cylinder actuator uses the "cushion loading" principle pioneered by Conoflow in the original springless diaphragm motor. An integral positioner is standard on most models. Stem position feedback is accomplished by means of a tension spring attached to the top of the cylinder piston. There are no external levers, mounting brackets or turnbuckles.

The cylinder is cast from a special aluminum alloy, machined and polished to a fine interior finish. Headplate and piston are also of aluminum. The piston is sealed by Buna N lipseals, which assure friction-free positioning and positive sealing. Stem is sealed with graphite-impregnated "O"-ring.

Standard Models

This booklet describes four standard types of series B-50 cylinder actuators with stem travel up to 10 inches. Actuators with different bores, strokes, or mounting arrangements than those shown here are also available. Consult factory for complete information.

Series B-50XC-A (figure 1) Models: B-51XC-A through B-54XC-A

Each model consists of a cylinder assembly and integral positioner designed for throttling control applications.

Series B-50XC (figure 1A) Models: B-51XC through B-55XC

Each model consists of a cylinder assembly, integral positioner, spacer bars and lower flange designed for throttling control applications.

Series B-50XW-A (figure 2) Models: B-51XW-A through B-54XW-A

Each model consists of a cylinder assembly designed for on-off control applications.

Series B-50XW (figure 2A) Models: B-51XW through B-55XW

Each model consists of a cylinder assembly, spacer bars and lower flange designed for on-off control applications.

Unpacking Actuator

Check for accessory equipment packed with the actuator. Match all parts with items listed on packing list and record nameplate serial numbers. The actuator nameplate will provide necessary data required for complete identification. Always refer to serial numbers when ordering spare parts, conversion parts, or accessory equipment.

Installation

The cylinder actuator can be mounted in either a vertical or horizontal position. Regulator and gauge for statically loading one side of piston are mounted and piped. Air supply should be regulated and filtered.

Note: A Conoflow airpak filter-regulator can be integrally mounted to provide constant regulation and filtration of air supply at the actuator.

Operation

Normal range of the actuator positioner for full stroke is 3-15 psi (other ranges, including 3-9 psi and 9-15 psi, are available). Connect the output line of the instrument to the connection marked INST. on the positioner. Then connect a supply of clean, filtered air to the supply connection (see Piping Schematic, page 2, Instructions and Parts List Booklet* to supply both the positioner and the cushion loading regulator. The supply pressure required is a function of the cylinder diameter and the load to be moved. Plant air supply up to 100 psi can safely be used to insure a reserve of power and maximum

speed. However, for economy of operation, use the lowest supply pressure with which satisfactory results can be obtained. The positioner has been tested and adjusted for operation with a supply pressure up to 80 psi. Refer to Instructions and Parts List Booklet* for additional information on positioner and adjustment for premium performance.

Zero Adjustment

To check zero adjustment (preset at factory), set the instrument output signal at the mid-point of its range (9 psi on a 3-15 psi range), turn zero adjustment coupling (figure 1) and note resultant position of actuator stem. Continue rotation of zero adjustment coupling in proper direction until actuator stem is at the mid-point of stroke. Adjust instrument output signal to low and high points in range and check the stem position at both ends of the stroke.

Cushion Loading Regulator

The cushion loading pressure has been arbitrarily set at approximately 20 psi. This pressure may be adjusted by means of the cushion loading regulator when higher or lower return forces are required. The standard regulator supplied can provide settings up to 60 psi and as low as 5 psi.

Range Changes

Standard range is 3-15 psi. Other ranges are available on request.

Maintenance

Positioner

The COMMANDAIRE positioners require a minimum of maintenance. If servicing or replacements are necessary, refer to the appropriate Instructions and Parts List Booklets. Consult factory for complete information.

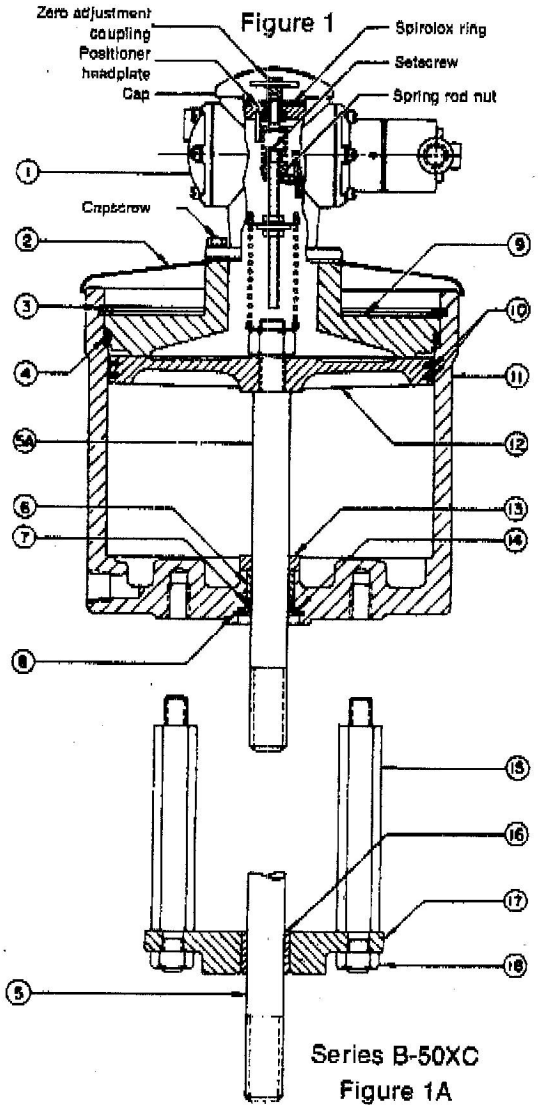
Cylinder

Normal life of lipseals (10)* is such that replacement will seldom be necessary under normal operating conditions. However, occasional inspection is desirable as a preventative maintenance measure. The following procedure must be followed in dismantling unit for inspection. Piston (12) should be in "up" position. Disconnect necessary tubing and bleed all air out of unit. Remove cap from positioner (1) and spirolox ring directly under cap, so that positioner headplate can be lifted out. Loosen set screw and remove spring rod nut. Then remove six cap screws around positioner flange and lift positioner from cylinder (11). Remove cover (2), spirolox retaining ring (3) and lift out cylinder headplate (9). Disconnect actuator stem (5) from unit being actuated. Slide out piston (12) and actuator stem (5) assembly. Lipseals (10) may now be inspected. Any water, dirt or sludge which may have accumulated inside the cylinder should be removed. "O"-ring (7) can be inspected by removing truarc ring (8) and retaining plate (14).

Before reassembling, apply a thin layer of grease (Dow-Corning #DC-33 light lubricant or equivalent) to inner wall of cylinder (11), actuator stem (5), lipseals (10), and the lipseal grooves in piston (12). Care should be exercised when reinserting piston (12) into cylinder (11), because lipseal (10) flare is necessarily of a larger diameter than the cylinder bore. Stem (5) should be carefully inserted through bearing (6) to prevent damage of bearing surface by thread of stem (5).

Series B-50XC-A

Figure 1



Series B-50XC

Figure 1A

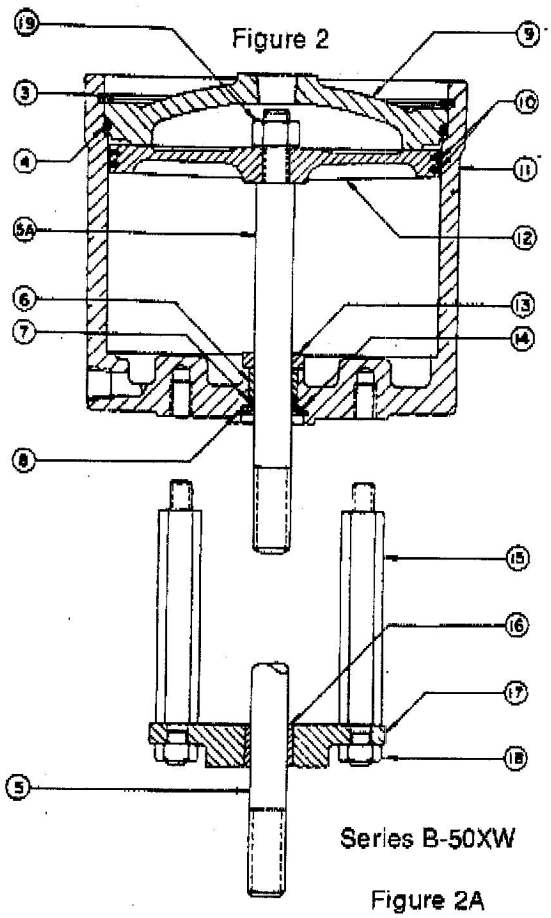
Parts List

Item no.	No. req'd.	Description
1	1	Positioner
2	1	Cover
3	1	Spirolox ring
*4	1	"O"-ring
5	1	Stem
5A	1	Stem
6	1	Oilite bearing
*7	1	"O"-ring
8	1	Truarc ring
9	1	Headplate
*10	2	Lipseal
11	1	Cylinder
12	1	Piston
13	1	Collar (when required)
14	1	Retaining plate
15	4	Spacer bar
16	1	Oilite bearing
17	1	Lower flange
18	4	Nut

*Recommended spare parts to be held at job site.

Series B-50XW-A

Figure 2



Series B-50XW

Figure 2A

Parts List

Item no.	No. req'd.	Description
3	1	Spirolox ring
*4	1	"O"-ring
5	1	Stem
5A	1	Stem
6	1	Oilite bearing
*7	1	"O"-ring
8	1	Truarc ring
9	1	Headplate
*10	2	Lipseal
11	1	Cylinder
12	1	Piston
13	1	Collar
14	1	Retaining plate
15	4	Spacer bar
16	1	Oilite bearing
17	1	Lower flange
18	4	Nut
19	1	Nut

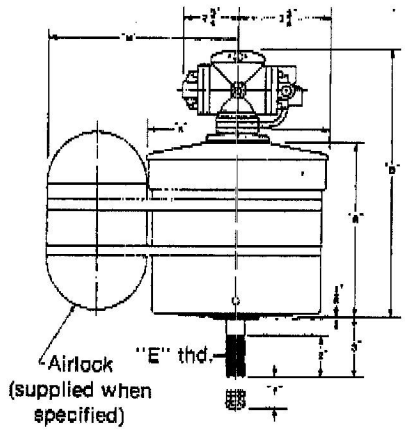
*Recommended spare parts to be held at job site.

Ordering Instructions

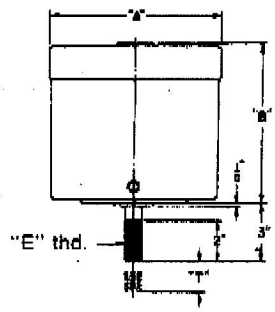
When ordering replacement or spare parts specify model no., figure no., item no., and description. This will permit positive identification and speed handling of order.

Series B-50 Cylinder Actuator Dimensions

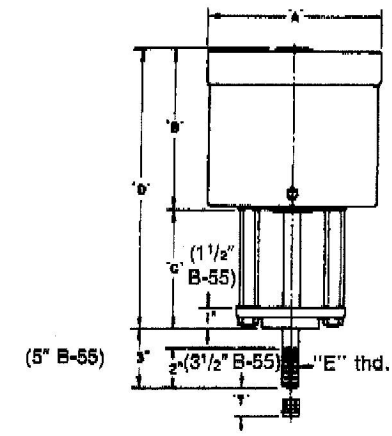
B-50XC-A Series



B-50XW-A Series

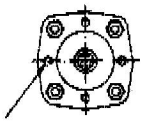


B-50XW Series



4 mtg. holes in base of cylinder "J" thd. "K" deep on "L" bolt circle.

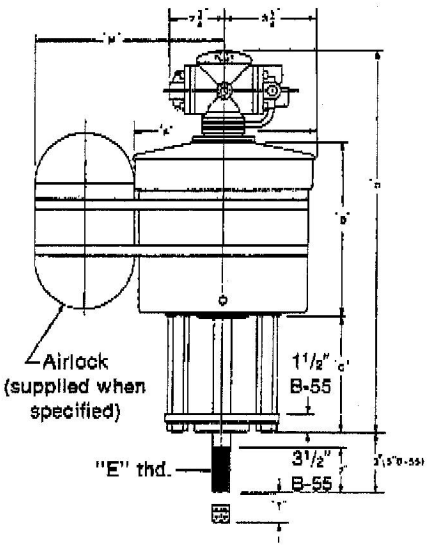
Inverted plan view of mounting base for XR-A&XW-A series.



"F" mtg. bolts 4-"G" mtg. holes req'd. for mtg. on "H" bolt circle.

Inverted plan view of mounting base for XR&XW series.

B-50XC Series



Notes: 1. For piping arrangements see A50-48.
2. Air connections 1/4" N.P.T.
3. For complete positioner dims see A50-49 for model 31.

Model	Bore	A	B	C	D	E	F	G	H	J	K	L	M	T
B-51XC-3	4"	5 3/16	7 1/16	5	16 3/4	5/8 - 18	3/8	13/32	2 3/4	—	—	—	6 1/4	3"
B-51XC-4	4"	5 3/16	8 1/16	6	18 3/4	5/8 - 18	3/8	13/32	2 3/4	—	—	—	6 1/4	4"
B-51XC-A3	4"	5 3/16	7 1/16	—	11 3/4	5/8 - 18	—	—	—	3/8 - 16	1/2	3 1/4	6 1/4	3"
B-51XIC-A4	4"	5 3/16	8 1/16	—	12 3/4	5/8 - 18	—	—	—	3/8 - 16	1/2	3 1/4	6 1/4	4"
B-51XW-3	4"	5	6 3/16	5	11 3/16	5/8 - 18	3/8	13/32	2 3/4	—	—	—	6 1/4	3"
B-51XW-4	4"	5	7 3/16	5	12 3/16	5/8 - 18	3/8	13/32	2 3/4	—	—	—	6 1/4	4"
B-51XW-A3	4"	5	6 3/16	—	—	5/8 - 18	—	—	—	3/8 - 16	1/2	3 1/4	6 1/4	3"
B-51XW-A4	4"	5	7 3/16	—	—	5/8 - 18	—	—	—	3/8 - 16	1/2	3 1/4	6 1/4	4"
B-52XC-4	6"	7 3/16	8 3/8	6	19 1/16	3/4 - 16	1/2	17/32	3 3/4	—	—	—	9 3/4	4"
B-52XC-6	6"	7 3/16	11	8	23 11/16	3/4 - 16	1/2	17/32	3 3/4	—	—	—	9 3/4	6"
B-52XC-A4	6"	7 3/16	8 3/8	—	13 1/16	3/4 - 16	—	—	—	1/2 - 13	13/16	4 1/2	9 3/4	4"
B-52XC-A6	6"	7 3/16	11	—	15 11/16	3/4 - 16	—	—	—	1/2 - 13	13/16	4 1/2	9 3/4	6"
B-52XW-4	6"	7	7 11/16	6	13 11/16	3/4 - 16	1/2	17/32	3 3/4	—	—	—	9 3/4	4"
B-52XW-6	6"	7	10 5/16	8	18 5/16	3/4 - 16	1/2	17/32	3 3/4	—	—	—	9 3/4	6"
B-52XW-A4	6"	7	7 11/16	—	—	3/4 - 16	—	—	—	1/2 - 13	13/16	4 1/2	9 3/4	4"
B-52XW-A6	6"	7	10 5/16	—	—	3/4 - 16	—	—	—	1/2 - 13	13/16	4 1/2	9 3/4	6"
B-53XC-4	8"	9 3/8	9 1/8	6	19 13/16	7/8 - 14	1/2	17/32	3 3/4	—	—	—	11 3/4	4"
B-53XC-6	8"	9 3/8	11 1/2	8	24 3/16	7/8 - 14	1/2	17/32	3 3/4	—	—	—	11 3/4	6"
B-53XC-8	8"	9 3/8	13 1/2	10	28 3/16	7/8 - 14	1/2	17/32	3 3/4	—	—	—	11 3/4	8"
B-53XC-10	10"	9 3/8	15 1/2	12	32 3/16	7/8 - 14	1/2	17/32	3 3/4	—	—	—	11 3/4	10"
B-53XC-A4	8"	9 3/8	9 1/8	—	13 13/16	7/8 - 14	—	—	—	1/2 - 13	13/16	4 1/2	11 3/4	4"
B-53XC-A6	8"	9 3/8	11 1/2	—	16 3/16	7/8 - 14	—	—	—	1/2 - 13	13/16	4 1/2	11 3/4	6"
B-53XC-A8	8"	9 3/8	13 1/2	—	18 3/16	7/8 - 14	—	—	—	1/2 - 13	13/16	4 1/2	11 3/4	8"
B-53XC-A10	10"	9 3/8	15 1/2	—	—	7/8 - 14	—	—	—	1/2 - 13	13/16	4 1/2	11 3/4	10"
B-53XW-4	8"	9 3/8	8 5/8	6	14 5/8	7/8 - 14	1/2	17/32	3 3/4	—	—	—	11 3/4	4"
B-53XW-6	8"	9 3/8	11	8	19	7/8 - 14	1/2	17/32	3 3/4	—	—	—	11 3/4	6"
B-53XW-8	8"	9 3/8	13	10	23	7/8 - 14	1/2	17/32	3 3/4	—	—	—	11 3/4	8"
B-53XW-10	10"	9 5/8	15	12	27	7/8 - 14	1/2	17/32	3 3/4	—	—	—	11 3/4	10"
B-53XW-A4	8"	9 3/8	8 5/8	—	—	7/8 - 14	—	—	—	1/2 - 13	13/16	4 1/2	11 3/4	4"
B-53XW-A6	8"	9 3/8	11	—	—	7/8 - 14	—	—	—	1/2 - 13	13/16	4 1/2	11 3/4	6"
B-53XW-A8	8"	9 3/8	13	—	—	7/8 - 14	—	—	—	1/2 - 13	13/16	4 1/2	11 3/4	8"
B-53XW-A10	10"	9 3/8	15	—	—	7/8 - 14	—	—	—	1/2 - 13	13/16	4 1/2	11 3/4	10"
B-54XC-4	10"	11 1/4	10 1/2	6	21 3/16	1 1/8 - 12	1/2	17/32	3 3/4	—	—	—	12 1/2	4"
B-54XC-A4	10"	11 1/4	10 1/2	—	15 3/16	1 1/8 - 12	—	—	—	1/2 - 13	13/16	4 1/2	12 1/2	4"
B-54XW-4	10"	11	11 1/8	6	17 1/8	1 1/8 - 12	1/2	17/32	3 3/4	—	—	—	12 1/2	4"
B-54XW-A4	10"	11	11 1/8	—	—	1 1/8 - 12	—	—	—	1/2 - 13	13/16	4 1/2	12 1/2	4"
B-55XC-4	12 1/2	15	11 5/8	7 1/2	23 3/4	1 3/4 - 12	1	1 1/16	8	—	—	—	20	4"
B-55XW-4	12 1/2"	15	12 1/2	7 1/2	20	1 3/4 - 12	1	1 1/16	8	—	—	—	20	4"

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FOREMOST IN CONTROL ELEMENTS

INSTRUCTION AND MAINTENANCE MANUALS
B2700 - B2800
Auxiliary Manual Actuators

GENERAL

1) Drawing PL6-3 (6" Diameter Handwheel)
   B2700 (1500 lbs. Stem thrust, small handwheel)
2) Drawing PL6-4 (18" Diameter Handwheel)
   B2800 (4000 lbs. Stem thrust, large handwheel)
3) Drawing A6-15 Dimensional Data

*Note: 1) Up to 4'' Stroke
2) Cannot be used on B50 or B55

The Auxiliary Manual Actuator permits manual operation during start-up or emergency periods. The Manual Actuator has a clutch mechanism to engage the handwheel during emergency conditions and to disengage the handwheel for normal (automatic) operation.

*Note: (Manual Actuator cannot be back-driven by the actuator and care must be taken to assure that unit is disengaged before operating automatically).

MANUAL OPERATION

For manual operation, the SUPPLY AIR MUST FIRST BE TURNED OFF AND THE EQUALIZING VALVE OPENED (see Dwg. A50-48 for piping schematic). This procedure is necessary to equalize the pressure across the piston of the cylinder actuator. The clutch (9) may now be **pushed into** the housing (23) and the handwheel (25) rotated to engage and move the rack (22) as required.

To return the cylinder actuator to normal (automatic) operation, the clutch (9) **must be pulled out** of the housing (23) to the index point so that the handwheel (25) is disengaged from the rack (22). With the clutch (9) disengaged, close the equalizing valve and turn on full supply air. The unit is now ready for normal automatic operation.

MAINTENANCE

The Manual Actuator has a grease fitting (18) in the housing (23) to permit lubrication of the gears. Greasing this fitting approximately once a month will be sufficient to lubricate the gears.

A lubricant having penetration value of 430-470 and a melting point of 205 degrees F. is recommeded. Typical lubricants meeting this requirement are:

Type	Manufacturer
#0 Extra Light	Continental Oil
Semi-Fluid Oil ''E''	Gulf Company
Bearing Grease #00	Sinclair Company
Gargoyl Grease #480	Socony Company
Grease #608	Sun Oil Company

PRINCIPLE OF OPERATION

The Handwheel (25) is fixed to Worm (5), which upon rotation of the Handwheel (25), turns Worm Gear (16). The Worm Gear (16) is keyed to Worm Gear Insert (34). Worm Gear Insert (34) is coupled to the Shaft (33) by means of Pin (37). The Shaft (33) extends through (not attached to) the Spur Gear (14), and is attached to Clutch (9) by means of a Running Key (10). The Running Key (10) allows the Clutch (9) to be in either an open or engaged position, determined by two circular "V" Grooves in the Clutch (9) near the Indexing Ball (11). Pushing the Clutch (9) into the Housing (23) to the index point engages the tongues of the Clutch (9) with the tongues of the Spur Gear (14). Spur Gear (14) teeth are meshed with the teeth of the Rack(22). The Rack stem of the unit being actuated. Engagement of the Clutch (9), allows rotation of the Handwheel (25) to move the Rack (22) up or down as required.

When the Clutch (9) is pulled out of the Housing (23), the tongues of the Clutch (9) are disengaged from the Spur Gear (14) allowing the Spur Gear (14) to rotate freely on the Shaft (33). The cylinder actuator is then free to operate the Rack (22) automatically without turning the Handwheel (25).

FIELD INSTALLATION OF AUXILIARY MANUAL ACTUATOR

The installation of the auxiliary manual actuator to a cylinder actuator in the field will require modification of the cylinder actuator to accommodate the manual operator rack (22) (Note: It is recommended that the factory be consulted)The air piping of the cylinder actuator must be modified to include the equalizing valve as shown in Drawing A50-48. Mounting of the Manual Actuator is performed in the following manner:

Engage the clutch (9) by pushing into the housing (23) to the index point. Remove the rack (22) from the manual actuator by rotating the handwheel (25) until the rack (22) can be pulled from the housing (23). Note that the teeth of the rack (22) face the handwheel (25) as the rack (22) is removed from the housing (23). Screw the male thread end of the rack (22) into the stem of the cylinder actuator until seated, then tighten with a wrench. With the teeth of the rack (22) facing the handwheel (25), place the bottom of the rack (22) into the top of the manual operator and slowly rotate the handwheel (25) to engage the teeth of the rack (22).

Rotate the handwheel (25) until flange of the manual actuator touches the bottom of the cylinder actuator. Line up the holes of the manual operator with the mounting holes of the cylinder actuator by rotating the manual actuator. Install 4 mounting bolts and tighten.

Install unit being actuated to manual actuator. Unit is now ready for operation.

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