



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 1 of 14

Pneumatic Actuator

Single Acting – Spring to Close

With Manual Override by Fixed Hand Wheel

UPS – W1 Series

Warning: Before using the actuator carefully read everything written in this manual. If these guidelines are not observed it could result to damage of equipment, the environment and the personnel.

CUSTOMER APPROVAL

APPLICATION

0	23/09/2005	First Issue	F.Prontelli	P.Chiavacci
Rev.	Date	Description	Issued by	Approved by



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 2 of 14

INDEX

- 1.0 Introduction
- 2.0 Brief Description
- 3.0 Installation
- 4.0 Setting the angular stroke of the actuator
 - 4.1 Setting the “close valve” position
 - 4.2 Setting the “open valve” position
- 5.0 Pneumatic connections
- 6.0 Start-up Procedures
- 7.0 Operating instructions for manual override
- 8.0 Maintenance operations
 - 8.1 General remarks
 - 8.2 Replacement of the pneumatic cylinder seals
 - 8.3 Replacement of the manual override seals
- 9.0 Grease specifications

Appendix A – Drawings



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 3 of 14

1.0 Introduction

Using this manual, the user can install, operate, adjust and maintain UniTorq actuators. Any relevant legislation regarding health and safety should be known and observed by the users. Actuators manufactured by UniTorq are designed and manufactured with consideration to expected conditions (i.e. pressure, temperature, etc). The execution of the instructions in this manual must be performed only by personnel properly qualified. Do not operate when the equipment is under pressure.

2.0 Brief Description

As shown in dwg. UPSCW1001 (see Appendix A), the actuator is composed of the following main parts:

- Housing Mechanism, containing the scotch-yoke mechanism;
- Pneumatic Cylinder, containing the pneumatic single-acting piston;
- Spring Enclosure, containing the spring (s) for the failure-mode operation;
- Manual Override, assembled at the end of the pneumatic cylinder, and provided with hand wheel (i.e., not declutchable) for manual operation.

At the topside of the mechanism housing a visual position indicator may be present. In dwg. UPSCW1001 two views of the actuator show the position of the visual indicator in two significant position of the actuator stroke.

3.0 Installation

When assembling the actuator into the valve, the actuator must be lifted using the suitable lifting points located in the upper part of the pneumatic cylinder and spring enclosure (see dwg. UPSCW1001 of Appendix A). Do not use these lifting points in order to lift the whole assembly of actuator plus valve.

Note that the installation of the actuator valve may require the interposition of an appropriate joint and mounting stool. You must assemble the actuator according with plant requirements and the valve model.

This is the correct procedure of assembly:

- a) Put the valve in the open or closed position according to the effective position of the actuator.
- b) Clean the grease out of the coupling flanges of valve and actuator.
- c) Lubricate the valve stem with oil or grease, in order to make the assembling easier.
- d) Lift the actuator in the appropriate way aligning the actuator yoke axis with the



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 4 of 14

- valve stem (this operation will be easier with the valve stem in vertical position).
- e) Before connecting valve and actuator, make sure you have assembled the joint and mounting stool (if any) on the valve.
 - f) Lower the actuator onto the valve so that the valve stem slips in the actuator yoke.
 - g) Fasten the actuator to the valve using the stud bolts, which are screwed to its coupling flange.

4.0 Setting the angular stroke of the actuator

The angular stroke of the actuator is always set in the factory before delivery. This is especially true every time the actuator delivered is already assembled on the valve. Despite this fact, the setting of the angular stroke may be done again “on site” by performing the operations described in the two following paragraphs.

4.1 Setting of the ‘closed valve’ position

On spring return fail close actuators, provided with manual override by fixed hand wheel, the “closed valve” position can be set by adjusting the stop screw located at the end of the manual override tube. In this case, before setting the “closed valve” position, make the spring decompress by removing the air supply to the pneumatic cylinder of the actuator.

Then proceed as follows (see dwg. UPSCW1002 of Appendix A):

- a) Remove the cap nut (59) and unscrew the nut (57)
- b) If the valve (on which the actuator has been assembled) can't reach the fully closed position, as it stops between the fully open and the fully closed position then unscrew the stop screw (58) counterclockwise and turn the hand wheel in the direction required to close the valve. Do this until the valve finally reaches the fully closed position.
- c) If the valve exceeds the fully closed position, then slightly turn the hand wheel in the direction required to open the valve, until the valve has reached its fully closed position. Then screw the stop screw (58) in clockwise direction, until it reaches the end screw (53) of the manual override.
- d) Tighten the nut (57) on the stop screw, making sure that the relevant seals (60) are correctly positioned and not damaged.
- e) Screw the cap nut (59) on the stop screw, firmly tightening it against the nut (57).



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 5 of 14

4.2 Setting of the “open valve” position

On spring return, fail to close actuators; the ‘open valve’ position can be set by adjusting the stop screw (28) located inside the end flange (31) of the spring enclosure. To perform the setting operation, proceed as follows:

- a) Remove the plug (30) and the relevant seal (29) at the end of the spring enclosure. This operation can be done without removing air supply to the actuator, since the interior of the spring enclosure is not pressurized.
- b) Supply air to the pneumatic cylinder of the actuator, which performs the operating stroke of the actuator itself. Then check the actual position of the valve at the end of the operating stroke.
- c) Before proceeding with the following instructions, move the yoke (2) towards the ‘closed valve’ position by removing air supply to the actuator. In this way, the tip of the pusher rod (39) is removed from the stop screw (28), and the last one can be safely adjusted.
- d) If the valve (during operation described at point b) can’t reach the fully open position, because it stops between the fully closed and fully open position, then unscrew the top screw (28) counterclockwise and repeat the operations listed above, starting from step b.
- e) If the valve (during operation described at point b) exceeded the fully open position, as it stops beyond that limit, then screw the stop screw (28) clockwise sense. Repeat the operations listed above, starting from step b.
- f) When the ‘open valve’ position has been set, reassemble the plug (30) and the relevant seal (29), making sure that the seals are not damaged.

5.0 Pneumatic Connections

- a) In order to connect the actuator to the pneumatic supply line, a drilled hole with NPT thread is available in the end flange (19) of the pneumatic cylinder. In spring return actuators, a similar hole in the head flange (15) in the pneumatic cylinder is used to house a ‘bug screen’; whose function is to protect the not-pressurized side of the cylinder from the ingress of foreign objects, thus assuming the correct ‘breathing action’ of that part.
- b) Before connecting the actuator to the pneumatic supply line, make sure that all the pipes and fittings used for connection are perfectly clean and free from any sort of foreign objects. Please also note that the size of the tubing and fittings, along with the actual pressure valve in the supply line, strongly affects the performances of the actuator. The use of smaller size pipe generally results in low airflow to the actuator, thus significantly reducing the operating speed during stroke. It’s therefore necessary to check that all the pipes and



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 6 of 14

fittings to check that all the pipes and fittings used for connection are according to the relevant specifications of the actual part.

- c) During the connection of the actuator to the pneumatic supply line make sure that all the fittings have been tightly fastened, in order to avoid leakages and pneumatic loss.
- d) When the connection to the pneumatic supply line has been completed, the actuator must be operated in order to check that it work correctly and that there aren't any leaks in the pneumatic connections. Before operating the actuator, make sure that the line pressure has been set to the required valve. Do not operate the actuator with supply pressure valves greater than those specified in the nameplate.
- e) Since pneumatic actuators may in some cases be operated by potentially dangerous gases, it is necessary to check that a potential leak or exhaust to the outside do not result in damages or injuries.

6.0 Start-up procedures

The start-up of the actuator must be carried out by performing the following instructions:

- 1) Check that the quality of the supply medium (instrument air or gases) is as prescribed; if not so, the use of a filter with a high filtering level may be suggested.
- 2) Set the supply pressure to the prescribed valve strictly avoiding to exceed the maximum allowable pressure. Keep in mind that the use of a pressure valve greater than the maximum allowed, may result in damages that jeopardize the correct and safe operation of the actuator.
- 3) Check that all the pneumatic connections are well tightened, showing no leaks. In case of leaks, tighten the nuts of the pipefittings.
- 4) Check the integrity of the whole actuator by means of a visual external inspection, in order to find out damages that may have occurred during transport or installation. Do not operate the actuator if damages are discovered.
- 5) When the actuator is provided with electric components (i.e., solenoid valves, micro switches, etc.) check that the relevant feed voltage is set to the prescribed valves/switches.
- 6) When the actuator is provided with manual override (with hand wheel or manual pump), check that the manual override itself works properly with regard to the operating instructions of the manual override, see paragraph 7.0.



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 7 of 14

7.0 Operating instructions for manual override

The actuator is provided with manual override by fixed hand wheel. The term “fixed” means that the hand wheel is permanently connected to the manual override device, and that no declutching option is available.

Before performing any manual operation by the hand wheel, be sure that any pneumatic supply has been removed from the pneumatic cylinder of the actuator.

In order to perform the operating stroke of the actuator (i.e., to open the valve on which the actuator has been assembled), turn the hand wheel counterclockwise.

In order to perform the closing stroke of the actuator (i.e., to close the valve on which the actuator has been assembled), turn the hand wheel clockwise.

8.0 Maintenance operations

8.1 General remarks

The actuator has been designed and manufactured in order to properly work for long periods, without the need of frequent maintenance operations. For safety reasons pay attention to the following guidelines. (see dwg. UPSCW1002 of Appendix A)

- 1) Do not attempt to disassemble the spring enclosure (38) from the housing (1) by unscrewing the relevant connecting screws (34); even in the full ‘closed valve’ position the spring (or springs) (37) may not be completely relaxed, and the spring enclosure could suddenly separate away from the housing, potentially causing damages or injuries.
- 2) Do not attempt to disassemble the head flanges (15) of the pneumatic cylinder from the housing (1), by unscrewing the relevant connecting screws (20), when the actuator is under pressured with a pneumatic supply.
- 3) Do not operate the actuator when the cover (8) has been removed from the housing (1).
- 4) Do not disassemble the manual override device from the end flange (19) of the pneumatic cylinder when the actuator is under pressure.

Whenever the replacement of the main seals is needed, the maintenance basic operations can be performed as explained in the following paragraphs. Note that all the maintenance operations must be carried out by well-trained personnel.



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 8 of 14

8.2 Replacement of the pneumatic cylinder seals

- 1) Remove any pneumatic supply to the cylinder, and isolate the actuator from any control signal (if present). Then, let the yoke (2) reach the fully closed 'valve position', thus relaxing the spring (or springs) (37) inside the spring enclosure (38). Turn the handle of the manual override device in the direction that allows the actuator to reach the fully 'closed valve' position (see also paragraph 7.0).
- 2) Remove the pneumatic supply pipe from the end flange (19) of the pneumatic actuator.
- 3) Remove the manual override device from the end flange (19) of the pneumatic cylinder, following the instructions describe in paragraph 8.3.
- 4) Unscrew and remove the nuts (22) from the rods (21).
- 5) Remove the end flange (19) from the tip of the cylinder tube (17).
- 6) Unscrew and remove the tie rods (21) from the head flange (16).
- 7) Remove the cylinder tube (17) from the head flange (18).
- 8) Remove the cover (8) from the housing (1).
- 9) Unscrew the piston rod (18) from the guide block (4) and extract the piston rod from the actuator housing, by pulling the piston towards the outside of the housing (1), the piston rod has to slide through the head flange (15) towards the outside of the housing (1).
- 10) Unscrew and remove the screw (36) (Note: in some actuator models, the screw (36) is replaced with a simple nut screwed on the threaded tip of the piston rod (16)).
- 11) Remove the piston (18) from the piston rod (16).
- 12) Unscrew and remove the screws (20) and then remove the head flange (15) from the housing (1).
- 13) Remove the o-rings (24) from the relevant groove in the head and end flanges. Replace them if damaged. Lubricate them with suitable grease.
- 14) Remove the seal (25) from the relevant seat in the head flange (15), Replace it if damaged or worn. Adequately lubricate the seal with suitable grease.
- 15) Remove the o-rings (26) and (35) from the relevant groove in the piston, and replace them if damaged or worn. Adequately lubricate them with suitable grease.
- 16) Remove the sliding ring (27) from the relevant groove in the piston. Replace it if damaged or worn. Lubricate the sliding ring with suitable grease.
- 17) Reassemble the piston (18) on the piston rod, by tightening the screw (38) (Note: in some actuator models, the screw (38) is replaced with a simple nut, screwed on the threaded tip of the piston rod (16)). Make sure that the o-ring (35) is correctly compressed in its seat.
- 18) Reassemble the head flange (15) on the actuator housing (1), fixing it by means of the screws (20). Then tighten the screws (20) firmly.



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 9 of 14

- 19) Insert the piston rod (with the piston still mounted at its end) into the relevant hole of the head flange pushing the piston rod towards the inside of the actuator housing. During this operation, make sure not to damage the seal (25) in the head to flange.
- 20) Screw the threaded end of the piston rod in the relevant hole located in the guide block (4). Tighten firmly the piston rod towards the guide block.
- 21) Reassemble the cylinder tube (17) on the head flange (15) making the tube slide on the piston. Make sure that during this operation, the o-ring (24) on the head flange, the o-ring (26) and the sliding ring (27) on the piston remain in their correct position.
- 22) Screw the tie rods (21) in the relevant holes of the head flange, and tighten them firmly.
- 23) Reassemble the end flange (19) on the cylinder tube (17) making sure that the o-ring (24) remains in its correct position.
- 24) Screw and uniformly tighten the nuts (22) on the relevant tie rods (21).
- 25) Reassemble the cover (8) on the actuator housing (1).
- 26) Connect the actuator to the pneumatic supply line, tightening all the fittings but still avoiding to feed the actuator with its supply medium.
- 27) Reassemble the manual override device at the end of the pneumatic cylinder, following the instructions described in paragraph 8.3.
- 28) Feed the actuator with its pneumatic supply, and perform some open-close operations in order to check that there are no leaks through the seals, and that all the movement is smooth and regular without interruption.

8.3 Replacement of the pneumatic cylinder seals

- 1) Remove any pneumatic supply to the cylinder and isolate the actuator from any control signal (if present). Then let the yoke (2) reach the fully 'closed valve' position, thus relaxing the spring (or the springs) (37) inside the spring enclosure (38). Turn the hand wheel of the manual override device in the direction that allows the actuator to reach the fully 'closed valve' position (see also paragraph 7.0).

To proceed with the following instructions, please refer to dwg. UPSCW1003 of Appendix A, where a typical section of the manual override device is shown with more details.

- 2) Unscrew and remove the screws (18) from the end flange (2) of the manual override. Now the manual override device can be completely removed from the end flange of the pneumatic cylinder.
- 3) Unscrew and remove the cap nut (10) and the nut (8). Now the stop setting screw (9) can be unscrewed and removed from the bottom plate (7), in order to avoid any damage.
- 4) Remove the anchor pin circlips (14) and the hand wheel (3).



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 10 of 14

- 5) Separate the end flange (2) from the matching flange (1), making the tube (4) slide on the keys (12). Then remove the end flange from the tube (4).
- 6) Check the o-rings (20), (21), and (23) in the relevant grooves, and replace them if damaged. Lubricate these o-rings with suitable grease.
- 7) Check the scraper (19) in the relevant groove of the end flange (2), and replace it if damaged or worn. Lubricate it with suitable grease.
- 8) Reassemble the end flange (2) on the tube (4), and push the end flange towards the matching flange (1).
- 9) Reassemble the hand wheel (3) on the tube (4), fixing it by the anchor pin circlips (14).
- 10) Reassemble the manual override device on the end flange of the pneumatic cylinder, fixing it with the screws (18). Be sure that during this operation, the o-rings (20), (21), (22), and (23) remain in their correct position. Tighten the screws (18) firmly.
- 11) Screw the stop setting screw (9) in the relevant threaded hole drilled in the bottom plate (7). Check the seals (11) and replace them if damaged.
- 12) Reassemble the nut (8), the seals (11) and the cap nut (10) on the stop setting screw (9), making sure not to damage the seals. Tighten the nut (8) and the cap nut (10) in order to avoid any leakage.
- 13) Perform the setting operation of the stop setting screw (9) following the instruction contained in paragraph 4.1.
- 14) Perform some open-close operations of the actuator by means of a suitable pneumatic supply, in order to check that there are no leakages through the seals, and that all the movements are smooth and regular.



OPERATING INSTRUCTIONS

*Pneumatic Actuator Single Acting-Spring to Close
with Manual Override by Fixed Handwheel
UPS-WI Series*

MMPSCW101

REV.0 - Page 11 of 14

9.0 Grease specifications

Since the moving parts of the mechanism have been lubricated for the life during assembly operations at the factory, it is not necessary to periodically lubricate the actuator. For information, the following table summarizes the main features of the standard grease used by UniTorq to lubricate the mechanical parts of the actuators.

MANUFACTURER	MOBILE
TRADE NAME	MOBIL TEMP 78
SOAP TYPE/OIL TYPE	MINERAL/INORGANIC
COLOR	GREY/BLACK
KINEMATIC VISCOSITY AT 400° C (ATSM D445)	485cSt
DROPPING POINT	32 cSt
WORKED PENETRATION AT 25°C (ASTM D217)	295-325 dmm
CONSISTENCY (NLGI GRADE)(ASTM D217)	1