

# GUIDE TO SELECT THE ACTUATOR

Ultraflex Control Systems proposes a complete line of electric chain and linear actuators, that allows the choice of the more suitable actuator for every kind of requirement. The following technical details are a valid support to this choice that must be effected considering the following elements:

## WINDOW TYPE



**Bottom hinged windows** (hinges on the bottom side, inside opening): chain actuators installation is recommended because they do not take up space inside the room and are aesthetically discreet.

Moreover, for these kind of installations, are not usually required special protection class for water or powder. The installation of linear actuators would need very long brackets (not available). For windows wider than 1,5 m we suggest to install actuators with two thrust points.

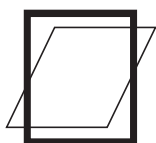


**Top hinged windows** (hinges on the top side, outside opening): it is recommended the installation of actuators with a special protection class and enough powerful to support with sufficient rigidity the maximum load that occurs when the window is completely opened.

We suggest actuators like Nano, Quasar, Twin Quasar, Vega, Twin Vega, Supermaster or Stile with double link chains. It is possible to install also linear or rack actuators, considering their encumbrance, the rotation of actuator's body and aesthetic effect. For window wider than 1,5 mm we suggest to install actuators with two thrust points, rack systems connected by connecting rod, or two actuators with control coupling unit.



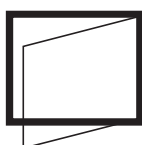
**Roof windows** (skylights, domes, etc.): see the installation instructions for top hinged windows. The hinges can be on one of the two horizontal sides or on the two vertical sides (central rotation axis). In that case it has to be considered as height of the window, the distance between the hinges and the fixing point of the actuator; besides, consider weight as zero if window is not equipped with brakes.



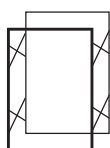
**Horizontal pivoting windows:** see the installation instructions for top or bottom hinged windows and bottom hinged windows according to actuator fixing position on the pivoting window. In the calculation of the opening and closing effort it is necessary to consider the height of the window as a distance between the fixing position of the actuator and the rotation point of the window, in order to avoid an extreme bending of the chain. Besides, consider weight as zero if window is not equipped with brakes.



**Louvres or sun blades windows:** it is necessary to specify the control level stroke for their movement and the necessary force to apply on it. After this choose an adequate rack/spindle actuator (Ulysses, Max, Rack). In case the actuator is installed exposed to bad weather conditions we suggest to contact our technical department.



**Normal turn window** with hinges on the vertical sides and inside or outside opening: it is necessary to install a chain actuator on the vertical side (with the same kind of brackets for bottom and top application), considering the right installation way of the chain: it doesn't have to be bent because of the gravity force to choose the adequate stroke and brackets. For choosing the adequate stroke and brackets consider as "height" of the window the distance between the hinges and the fixing point of the actuator.



**Parallel Windows** (outside parallel opening): it is required the installation of at least two chain actuators with speed synchronization, in order to keep the sash parallel to the frame. For window sides wider than 1,5 m we suggest to install two actuators per side or the installation of the locking drive E-Lock connected to the internal multilocking hardware. We suggest to install Synchro Vega chain actuators because of their small size, eventually integrated inside of the curtain wall profiles, having stroke suitable to the max opening of the parallel hinges.

## ACTUATOR STROKE

The necessity of a wide window opening contrasts with the following factors:

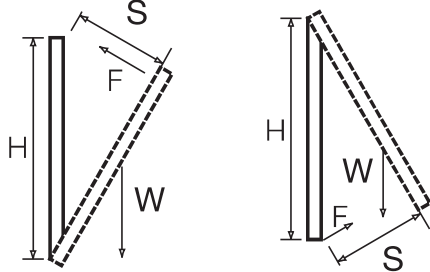
- for a chain actuator, if it is not used the pivoting brackets kit, the stroke must not exceed 1/3 of the window height, otherwise the chain bending would cause a loss of rigidity and for this reason a loss of performance in the long run. [In case of vents with four-bar hinges please contact our Technical Dpt.](#)
- for a linear actuator it is necessary to consider the actuator encumbrance inside the room; aesthetic effect apart, it grows as much as the required stroke increases, and it must be considered also the actuator rotation angle. In order to avoid interferences of the actuator with the elements in the room, it is necessary to evaluate carefully the position of the rotation axis opportunely choosing and positioning the fixing brackets. For this purpose, UCS proposes for all the linear actuators side fixing brackets, sliding within the proper dovetail slide on the actuator.

## ACTUATOR FORCE

To calculate the window opening and closing force, please refer to the following simplified formula:

In case of vents with four-bar hinges please contact our Technical Dpt.

### For vertical bottom or top hinged windows:



$$F \text{ (kg)} = \frac{W \text{ (kg)}}{2} \times \frac{S \text{ (mm)}}{H \text{ (mm)}}$$

$$W_{\max} \text{ (kg)} = 2 \times F \text{ (kg)} \times \frac{H \text{ (mm)}}{S \text{ (mm)}}$$

W = window leaf weight

W<sub>max</sub> = max window leaf weight

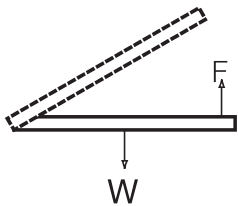
S = actuator stroke

F = required force (in kg, 1kg ~10 N)

H = window leaf height

Therefore, the required force is lower as higher is the window leaf and shorter is the required stroke.

### For horizontal windows (roof windows, skylights, domes, etc.):



$$F \text{ (kg)} = \frac{W \text{ (kg)} + SI \text{ (kg)}}{2}$$

$$W_{\max} \text{ (kg)} = [2 \times F \text{ (kg)}] - SI$$

W = window leaf weight

SI = snow load

W<sub>max</sub> = max window leaf weight

F = required force (in kg, 1kg ~10 N)

**For inclined windows** apply the formula for the horizontal windows; that is necessary if during the opening the window lies in horizontal position, and anyhow for higher safety margin.

**For windows with four bars (side arm) hinges:** the force needed depends on the hinge used; for any further information do not hesitate to contact our technical department.

**NOTE In the above mentioned formulas the wind load has not being considered:** it is necessarily to be considered above all for wide windows; if they are very high, for example, the greatest part of their weight is loaded on the hinges and the required opening force is very reduced, but in case of wind the effect on the large surface is considerable and the actuator must be chosen carefully.

## PROTECTION CLASS

The chain actuators are less protected from water or solid bodies (dust, sand, etc.) than the linear actuators. Some linear actuators, with protection class IP 65, are practically watertight in static conditions. For this reason we suggest to install chain actuators on bottom hinged windows or, in connection with a rain sensor, on top hinged windows. Quasar and Vega actuators are available with Protection Class IP 32.

## LARGE WINDOWS

For very large windows only one pushing point in the central position cannot be sufficient.

When the window is closed its corners cannot be watertight or airtight and, anyway, when it is opened the stability is compromised in case of wind. We recommend to install two pushing points (or pulling points) if the window is larger than 1,5 m and also for an inferior width if the window leaf rigidity (profile + glass or polycar-bonate) is not sufficient.

The installation of two electric actuators on the same window leaf is not possible if it is not used a suitable electronic (coupling) control system, because it is not possible to guarantee the constancy in time of the actuators speed, with consequent probable break of one of them.

In this case if the actuators are not equipped with the electronic stop system, it results the break of one actuator or of the window.

The control panel for coupling actuators on the same vent controls only the current absorption of the connected motors, so it can be supplied only with couples of actuators selected during their production by UCS.

The best solution for big windows are Synchro Nano, Synchro Quasar, Synchro Quasar-L, Synchro Vega, Twin Quasar and Twin Vega. These actuators are equipped with integrated speed control sensor than enable the installation of more actuators on the same window without the usage of control panel to synchronize them.

Dual rack and double rack systems enable to have two, three or four pushing points mechanically synchronized with connection nodes.

For any further information do not hesitate to contact our technical department.