

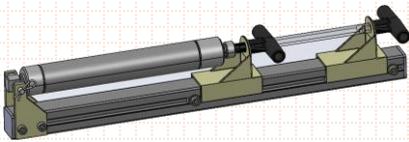
Using Clip Buddies with Pneumatic Actuators

CBPA6 and CBPA10

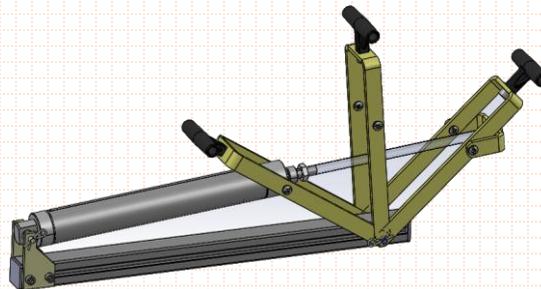
Clip Buddy

Patent 10,072,685

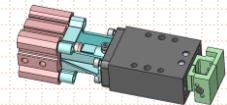
This document provides information for using Clip Buddies with pneumatic cylinder actuations (CYL and CYLM options) with the available CBPA6 and CBPA10 onboard pneumatic actuators. (for using Clip Buddies with shop air pressure, see other document)



CBPA6



CBPA10



Clip Buddy
with CYL Actuation

- 1) Airline Connections:** Connect all of the Clip Buddy cylinder base end ports together with the base end port of the CBPA actuator cylinder, and all Clip Buddy cylinder rod end ports together with the rod end port of the CBPA actuator cylinder.
- 2) Airline Size:** Use 5/32" OD flexible tubing. This size is required to prevent a large volume of air to be pressurized when the system is activated. Larger tubing may prevent the system from operating properly.
- 3) Airline Routing:** Route the airlines with no more length than is necessary to deliver air pressure to all Clip Buddy units. Use tube tees and wyes (rather than manifolds) to reduce the total length of airline. The pressure and airflow are both quite low, so there is no detrimental affect from using tube tees and wyes. The system is designed for up to (3m extend + 3m retract) airline for the CBPA6, and up to (5m extend+5m retract) airline length for the CBPA10.
- 4) Centering the cylinder for operation:** When all airlines are connected, follow the instructions printed on the pneumatic cylinder actuator (CBPA6 or CBPA10) to center the units.

Suitable fittings and airlines

Suitable Airline:

McMaster p/n 5112K52 (\varnothing 5/32"OD flexible standard nylon tubing)
or any other airline \varnothing 5/32" OD compatible with push-to-connect fittings

Suitable Fittings for the Actuators CBPA6 and CBPA10:

McMaster p/n 5779K146 (1/8 npt male x \varnothing 5/32" tube elbow)
or any other fittings with 1/8" NPT male and \varnothing 5/32" push-to-connect

Suitable Fittings for connecting to Clip Buddies with CYL or CYLM actuation:

McMaster p/n 5779K284 (10-32 male \varnothing 5/32" tube elbow)
or any other fittings with 10-32 male and \varnothing 5/32" push-to-connect

Suitable Tees and Wyes for airline routing:

Tee: McMaster p/n 5779K32
Wye: McMaster p/n 5779K42
or any other tees and wyes for \varnothing 5/32" airline



Using Clip Buddies with SHOP AIR PRESSURE

Clip Buddy

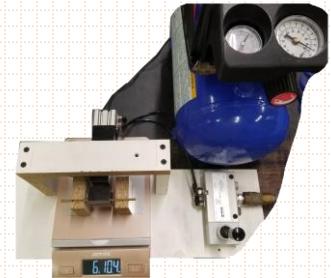
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This document provides information for using Clip Buddies with pneumatic cylinder actuations (CYL and CYLM options) with **shop air pressure**. (for using the available CBPA6 and CBPA10 onboard pneumatic actuators, see other document)

DISCLAIMER: The information provided in this document is intended for end-users to develop fixtures which are functional and not detrimental to users' safety nor health. The determination of suitability is the sole responsibility of the user. Fractal Engineering does not claim this information to be definitive nor to establish suitable requirements for the end-user. Testing results shown are anecdotal in nature for a single test and variation can be expected. The end user is responsible to determine the suitability for any and all applications.

1) Calculation of theoretical pinch force: The geometry and engineering static analysis were applied to a Clip Buddy with the CB4CYL/CB4CYLM optional pneumatic cylinder actuator to determine the theoretical pinch force applied given a known input air pressure. The theoretical calculation result is that a 8psi input pressure will result in a 9.6 lb. pinch force at the jaws. The theoretical pinch force will scale up and down directly proportional to the input pressure. It is expected that real-world pinch forces will be lower than the theoretical calculations due to friction in the cylinder and the Clip Buddy unit.

2) Measured Pinch Force: The theoretical calculation is expected to be inaccurate relative to real-world forces due to internal friction within the pneumatic cylinder and the Clip Buddy unit. A bench test was performed to determine empirical results. At an input pressure of 15psi, the resulting pinch force measured 8lbs which correlates with the theoretical calculation considering the presence of internal friction. The Clip Buddy operation was found to be reliable at this pressure. A finger placed between the jaws at this pressure resulted in a mild pinch with no injury.



3) Suitable air control items: Use a regulator, pressure gage, and valve that function properly at approximately 5psi or above.

Suitable Regulators:

SMC p/n AW20-N02B-1C (3-30psi, filter, regulator & mount bracket) plus AR20P-580AS (knob cover/lockout)
McMaster p/n 4328K1 (0-50psi, regulator-only, tamper-resistant) plus p/n 4328K32 (mount bracket)
Any other regulator with operating pressure range low-limit no greater than 5psi

Suitable Pressure Gages:

McMaster p/n 4000K652 (0-30psi for SMC AW20-N02B-1C with 1/8 npt port)
McMaster p/n 4328K25 (0-50psi for McMaster regulator 4328K1 with 1/4 npt port)
Any other gage with range of 0 to 30-50psi

Suitable Valves:

SMC p/n VH312-N02 (round body)
McMaster p/n 6650K8 (round body)
McMaster p/n 3368K13 (rectangular body)
Any other suitable valve for operating a double-acting cylinder

