

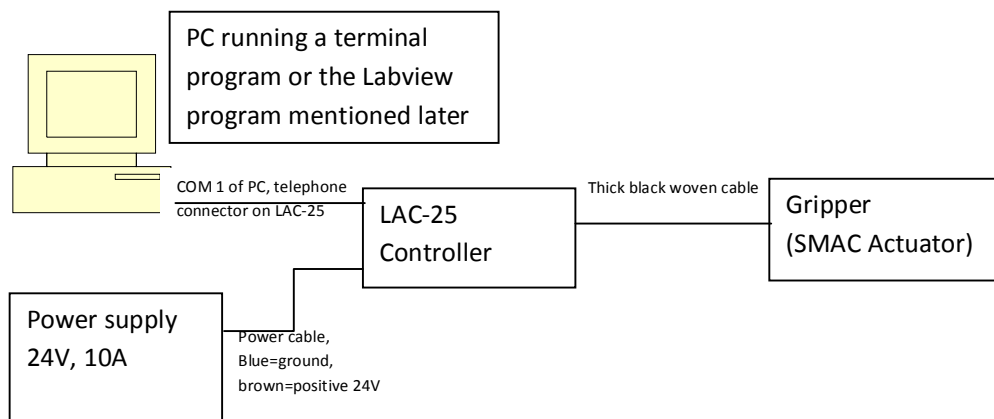
Getting started with the SMAC Actuator

By Sam Wane



The SMAC actuator is a gripper that can move under position control or force control. Having a gripper with adjustable force allows greater control over what it is handling. The gripper also has built-in encoders allowing it to measure the size of an item gripped.

The gripper is controlled via the LAC-25 and is connected as in the diagram below:



The LAC-25 manual can be downloaded from: <http://www.smac-mca.com/manuals.php>

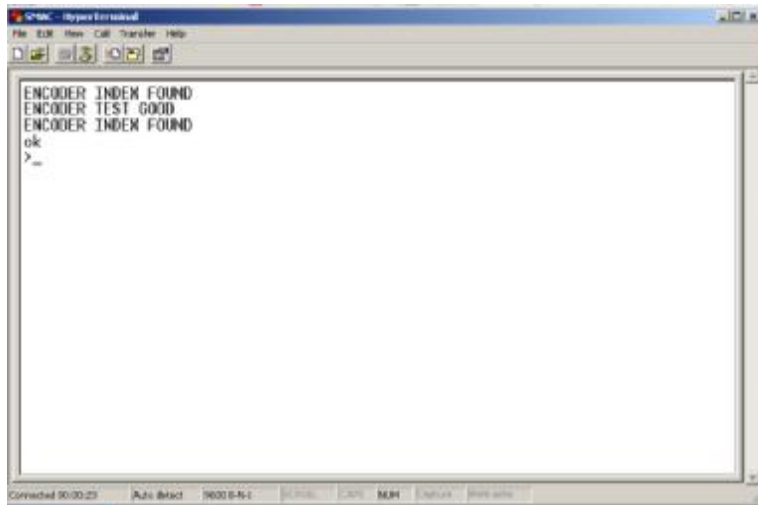
To connect it to a power supply:

- Brown wire is +24V
- Blue is ground
- Total current is 6A, so use a 10A power supply.

On the PC, use a terminal program (e.g. Hyperterminal)

- Hyperterminal settings: 9600, 8, None, no hardware.
- Connect using Hyperterminal before applying power to the SMAC Actuator.

Once the power is connected, the gripper should move through a self test and then you should see a message in the terminal window as below:



Commands are typed and are as follows:

The axis number starts the command, either 1,2 or 0 being both.

1-right finger (from wrist to hand point of view), 2- left finger, 0-both fingers together. This is replaced with a # in the following examples:

VE-tell version

#MF – motor off

#MN – motor on

#PM – position mode

#MN – motor on

#GH – go home

Eg. Type:

>OPM

>OMN

>OGH

Moves motors to home position (0).

#MA-move to absolute position (0 is home fully open, increase value to close up to around 1000)

GO-execute motion command

Eg

>1MA200

>GO

Moves the right finger to position 2 (closed slightly)

#TP – tell real position as in OTP

#TK – tell constants

#QM – set force mode (-32767 to 32767) Note that positive value will close the gripper and negative values force it open.

NOTE: Do not leave the gripper on in torque mode, ensure you set the torque to zero in between tests. Do not use a torque value greater than 10000.

>OMF

>OQM

>OMN

>SQ2000

Will close the gripper with a force value of 2000.

Labview control and dynamic slip sensing

The gripper can be controlled through Labview.

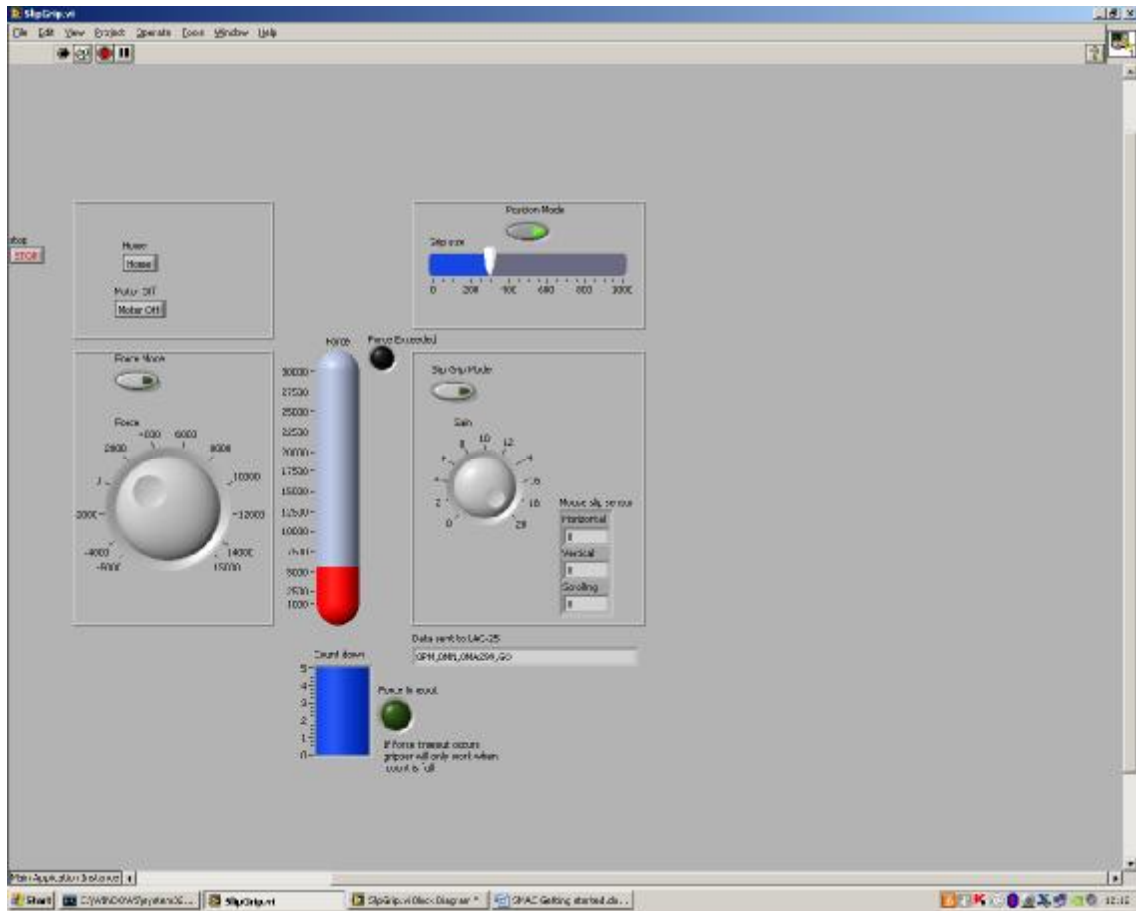
There are buttons to home the fingers and turn off the motor power.

There is a position control mode where the fingers can be made to move to a position depending on the slider.

There is a force control mode where the force can be dynamically altered.

Note:As a failsafe, there is a counter in the program that will not allow a force greater than 7000 to operated for more than 5 seconds. The countdown will decrease and the gripper motors will be disengaged when the time runs out. The countdown will then increase and the gripper can only be used once the timer has reached its maximum.

This also offers dynamic slip control in that it increases its gripping force in relation to the magnitude of slip of a grasped object. The slip sensor needs to be plugged in via the USB port and shares the same port as the mouse. Movement of an object in the fingers will appear as a mouse movement and will increase the gripping force. The GAIN alters how much the force increases depending on the object slip.



The picture below shows the force magnitude to hold an empty cup



As the mass increases (due to bolts being added to the cup), the grip force increases as can be seen in the thermometer representing grip force.

