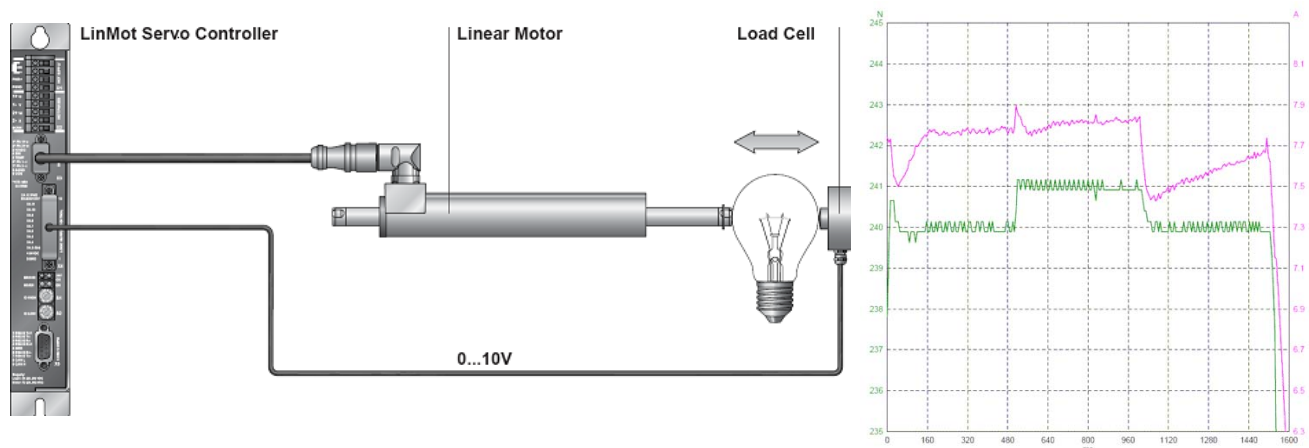# Technology Function Force Control

Introduction

The technology function "Force Control" for LinMot servo controller series E1100 and B1100 offers a closed loop force control with down to 0.1N resolution. Closed loop force control permits to apply a constant force with high precision over the whole stroke range independent from the actual position. As the applied force is measured by a load cell and directly controlled by the servo controller, side effects like friction, slip-stick effects and temperature changes will not influence the resulting force applied to the object.

Servo controller E1100 or B1100 with force control technology function. The force applied to the object is generated by the linear motor and measured in the load cell. The applied force measured in the load cell is directly fed back to the servo controller

Applied force (green) and motor current (pink) in a closed loop force control application during an increasing of the force set value from 240N to 241N

Motion Commands

The following new motion commands are available:

VAI Go To Pos With Higher Force Ctrl Limit (380xh)
> Moves to the defined target position, if the measured force reaches the defined value the controller switches to the force control mode with Target Force = Force Limit. To change back to position control mode use motion command VAI Go To Pos From Act Pos And Reset Force Control (381xh)!

VAI Go To Pos From Act Pos And Reset Force Control (381xh)
> Reinstalls the position control mode and moves to the defined target position

Force Ctrl Change Target Force (382xh)
> This command could be used to change the Target Force during the force control mode

VAI Go To Pos With Higher Force Ctrl Limit And Target Force (383xh)
> Moves to the defined target position, if the measured force reaches Force Limit the controller switches to the force control mode with Target Force = Target Force. To change back to position control mode use motion command VAI Go To Pos From Act Pos And Reset Force Control (381xh)!

VAI Go To Pos With Lower Force Ctrl Limit (384xh)
> Moves to the defined target position, if the measured force reaches the defined value, the controller switches to the force control mode with Target Force = Force Limit. To change back to position control mode use motion command VAI Go To Pos From Act Pos And Reset Force Control (381xh)!

VAI Go To Pos With Lower Force Ctrl Limit And Target Force (385xh)
> Moves to the defined target position, if the measured force reaches the defined value, the controller switches to the force control mode with Target Force = Target Force. To change back to position control mode use motion command VAI Go To Pos From Act Pos And Reset Force Control (381xh)!

A detailed description of the commands can be found in the "Motion Control SW" manual.

LinMot®

Technical Data

- E1100: Analog Input-Signal: X4.4: 0..10V, 10 Bit Resolution
  Attention: Input with 4.7 kΩ pulldown resistor

- B1100: Analog Input-Signal: X14.20: 0..10V, 10 Bit Resolution
  X14.8/X14.21: Diff Input +/- 10V, 10 Bit Resolution

- Supported Controllers: Series E1100, except for MT/MP controllers
  Series B1100, except for PP controllers

Installation

This section describes how to activate the force control technology function and how to configure the analog input.

1. **Get the access code**
   Contact your local LinMot-Distributor, see www.linmot.com, to order your access code.
   Keep the serial number of your controller ready.

2. **Input the access code**
   Open LinMotTalk1100 and login to your controller
   Under **Controller\Set Access Code** the following window will open:

A maximum of four keys can be set on the controller. Under active keys all valid installed keys are listed (key value and access code). A new key can be set by selecting the key name and defining the value and access code. With the write button, the key and access code are written to the controller. As soon as the controller has rebooted (click the activate button) the new key will be active, if the access code fits.
Please note: Access codes are controller specific. They cannot be copied from one controller to another.

3. **E1100: Configuration of analog input**

   UPID 150Fh: Parameters\Motion Control SW\Protected Technology Functions\Analog Force Feedback Control\Input Selection\
   ▶ **Select Analog Input On X4.4**

   UPID 1501h/1502h: Parameters\Motion Control SW\Protected Technology Functions\Analog Force Feedback Control\Analog Force Feedback Config\
   ▶ **Set the force that stands for 0V (UPID 1501h) and the force that stands for 10 V (UPID 1502h)**

   UPID 1505h/1508h/1507h: Parameters\Motion Control SW\Protected Technology Functions\Analog Force Feedback Control\Force Control Parameters\
   ▶ **Set the control parameters.**

4. **E1100: Configuration of analog input (X14.20 or X14.8/X14.21)**

   UPID 633Dh: Parameters\Motion Control SW\Protected Technology Functions\Analog Force Feedback Control\Input Selection\

   ► **Select the input to which the analog force signal is wired.**

   UPID E33Bh/E33Ch: Parameters\Motion Control SW\Protected Technology Functions\Analog Force Feedback Control\Analog Force Feedback Config\

   ► **Set the force that stands for 0V (in case of X14.20) or –10V (in case of X14.8/X14.21) (UPID E33Bh) and the force that stands for 10 V (UPID E33Ch)**

   UPID 6338h/6339h/E33Ah: Parameters\Motion Control SW\Protected Technology Functions\Analog Force Feedback Control\Force Control Parameters\

   ► **Set the control parameters.**

5. **Connect the analog signal from the load cell with the selected input (E1100 X4.4, B1100 X14.20 or X14.8/X14.21) on the controller**

6. **Use the force control motion commands within your application**

7. **If necessary the force control parameters have to be adapted**
   Parameters\Motion Control SW\Protected Technology Functions\Analog Force Feedback Control\Force Control Parameters

Ordering Information

Motion Control SW		
Article	Description	Part No.
TF-1100-Force-Control	Technology Function Force Control	0150-2503