For high-speed, highly accurate continuous feeding of powder and dry solids

AD-4826
Model predictive feeder controller

AD-4826-30G/200G/500G
Vibratory feeder

A&D

A&D Company, Limited
http://www.aandd.jp

Model predictive feeder controller ideal for control optimization

- **Equipped with model predictive control technology making more superior performance possible compared with PID control**

- **Auto tuning function enables simple setting of control parameters**

- **Applicable for both nonlinear controlled objects and linear controlled objects**

- **Stable control for minimizing energy loss and deterioration of actuator**

- **Equipped with disturbance (vibration) cancellation function**

- **Map-based control function allows for accurate continuous feeding during refilling of materials**

- **GUI screen permits simple and intuitive operation**

- **Simultaneous control of up to 4 feeders possible**

- **Application of model predictive control to existing screw feeders, circle feeders, table feeders, etc. possible**
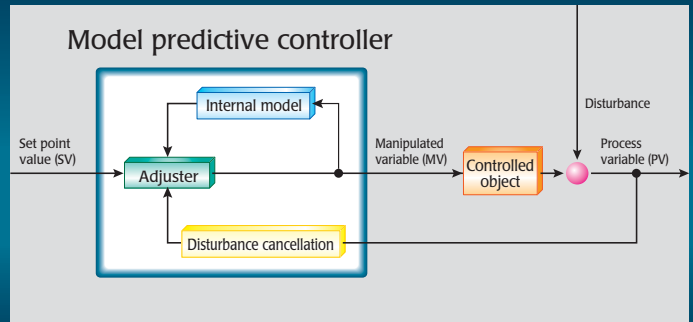
AD-4826
Model predictive feeder controller

AD-4826-30G
AD-4826-200G
AD-4826-500G
Vibratory feeder

500G   200G   30G

Model predictive loss-in-weight controller / Vibratory feeder

Model predictive control

Model predictive control is a method of process control to determine a manipulated variable, which enables a process variable to reach a set point by predicting future moves in a process using models of the controlled object's behavior. The internal model is used to predict if any deviation from the set point will occur in the immediate future when process control is continued with the current manipulated variable. If a deviation is predicted, an adjusted manipulated variable is output and sent to the controlled object. Unlike PID control which implements a correction after a control deviation occurs, model predictive control predicts a deviation in advance using a model of the system's behavior to enable stable process control while avoiding hunting (unstable movement). The greatest advantages of model predictive control are process control stability, disturbance cancellation function, improved response to changes and improved set point following capability, as well as a high tolerance to the influence of changes in a process.

Model predictive control can be applied to a process that is too difficult to control with general PID control. Its stable control enables improvement of maintenance productivity by minimizing energy waste and excess load on the driving part.

## Auto-tuning function for controlled object modeling

Setting of the AD-4826 control parameters is not difficult. It uses its auto-tuning function to automatically model the behavior of a controlled object and controls the process using the model. Auto tuning is also very simple. Just connect the AD-4826 controller to a feeder, start feeding with a material and then implement the 4 steps of the step response method during the feeding process to obtain dead time plus first-order lag elements as transfer function. The AD-4826's auto-tuning function and control function apply to a linear system as well as to a nonlinear system, which is too difficult to control with PID control.

This auto-tuning function requires no special techniques and enables easy modeling of a controlled object in a short period of time.
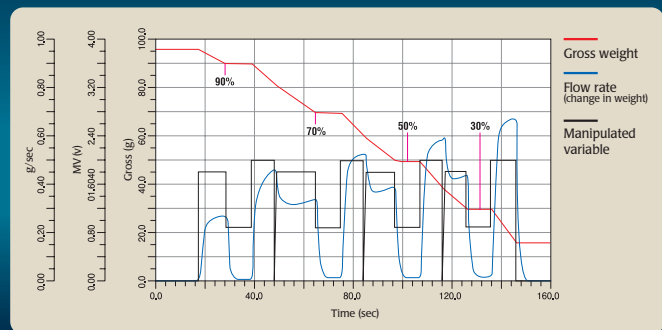
Stable control minimizing energy loss and deterioration of actuator

Since PID control implements the correction of a manipulated variable after the occurrence of a control deviation, there is a large amount of change in the manipulated variable as well as in the process variable. Therefore, with PID control, the extra load acts upon the actuator and causes energy loss.

On the other hand, model predictive control can provide stable control, minimizing hunting (unstable movement) to improve energy efficiency and offers excellent maintenance productivity.
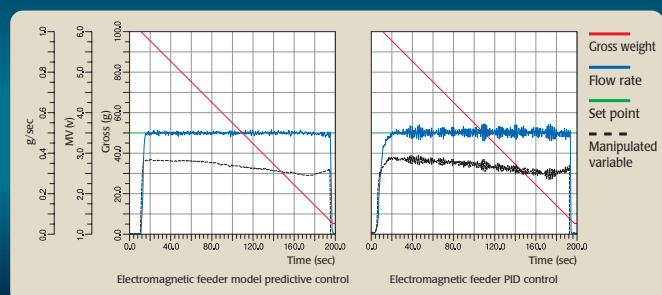
Disturbance (vibration) cancellation function

When the AD-4826 detects a disturbance (vibration) during continuous feeding, its disturbance (vibration) cancellation function works to cancel the influence of this disturbance (vibration). It promises stable continuous feeding by preventing a feeding outage, which is caused by disturbance, as well as an excess increase or decrease in flow rate.

Map-based control function for continuous feeding during refilling

To continue continuous feeding, it is necessary to refill the feeder with material when its content is reduced. The AD-4826 is equipped with a map-based control function to allow the feeder to be refilled during continuous feeding.

The map-based control function stores in memory plotted data of the correlation between manipulated variables and weight values, which are measured during continuous feeding, to accurately control the manipulated variables while checking weight values with the weight sensor when refilling the feeder.

Therefore, the AD-4826 enables highly accurate continuous feeding even while the feeder is being refilled.
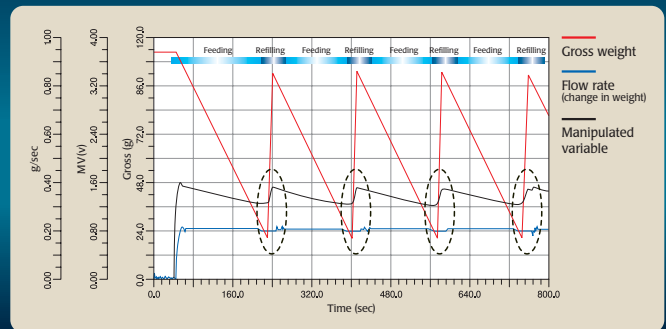
Controlling up to 4 feeders

The AD-4826 controller can be connected to up to 4 feeders for individual control.
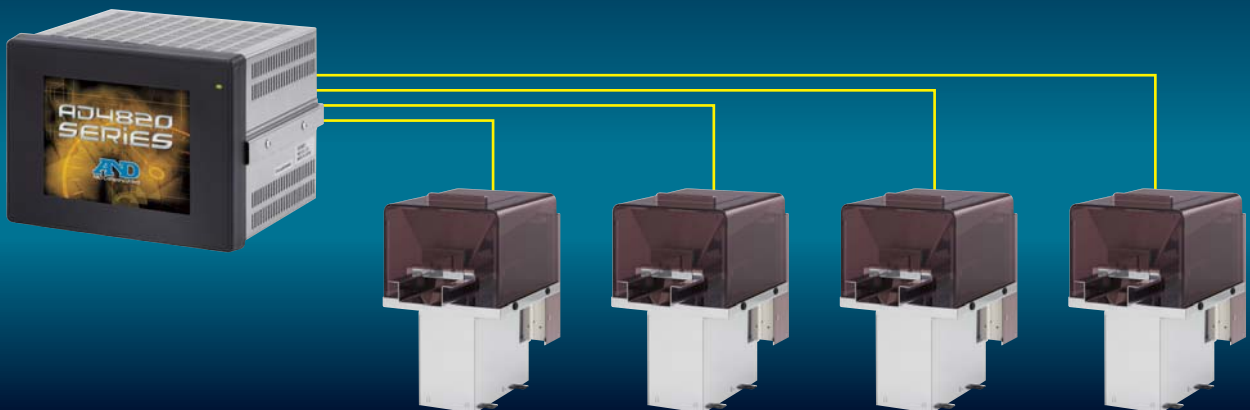
Model predictive feeder controller applicable for existing screw feeders, circle feeders, table feeders, etc.

The AD-4826 can implement model predictive control with a screw feeder, circle feeder, table feeder or rotary feeder that has been controlled with PID control.

GUI screen allowing intuitive operation

Continuous feeding control mode menu screen
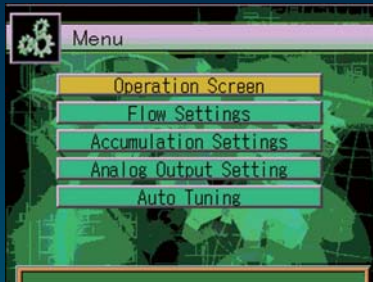
Batch feeding control mode menu screen

Continuous feeding control mode operation screen

- Feeder number
- Start/Stop control button
- Gross weight indicator
- Accumulation value indicator
- Flow rate indicator
- Target flow rate setting box
- Manipulative variable indicator
- MV manual setting button
- To display the trend graph screen
- To display the feeder limit setting screen
- Feeders 1~4 display selection
- To display the continuous feeding setting screen

Batch feeding control mode operation screen

- Net weight indicator
- Target weight setting box

Trend graph screen

- Gross weight
- Flow rate
- Target flow rate
- Manipulative variable
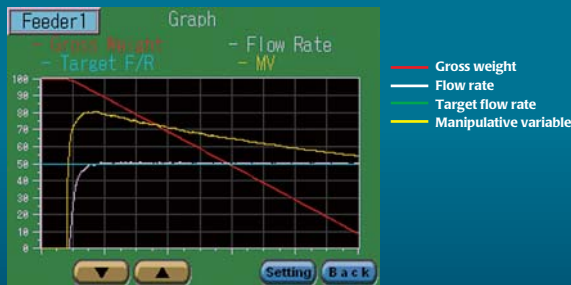
Auto tuning screen
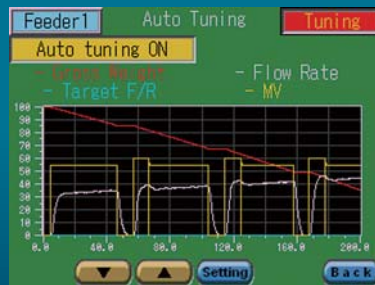
Feeders 1 – 4 operation screens

Continuous/Batch feeding control selection screen

Feeder controller specifications

Model	AD-4826
CPU	SH4
OS	RTOS
SDRAM	64MB
Compact flash memory	64MB
Option slots	4
Display	5.7 inch STN color liquid crystal Backlight luminance half life: 75,000 hours typ. Touch panel: Analog film
Standard interface	Serial interface: Full duplex RS-232C/ full duplex RS-485 switch USB1.1 port LAN 10Base-T Non-polar semi-conductor relay (controller startup status output)
Power	AC85V − 250V, 50/60Hz, approx. 30VA
Ambient temperature	0 - 40°C
External dimensions (WxHxD)	192 x 144 x 191mm (including protruding part)

Load cell input specifications

Input sensitivity	0.15µV/D or over
Zero adjustment range	0mV − 25mV
Load cell applied voltage	4.75 − 5.25V Built-in remote sensing function Up to 8 load cells (350Ω) can be connected to a channel. (If 4 load cell input modules are installed on a slot, up to 4 load cells can be connected to a channel.)
Temperature coefficient	Zero point: ±0.1µV/°C max. Span: ±8ppm/°C max.
Nonlinearity	±20ppm max.
Measuring range	±37mV min.
A/D conversion method	24 bit delta sigma method
Internal resolution	Approx. 5,700,000 counts
Maximum display resolution	Approx. 1,000,000 counts per 1mV/V
Sampling rate	6.25 - 1920 times / second

External input/output boards specifications

AD-4820-01 Analog input interface board (4 modules can be installed on a board)	Applicable modules	AD-4820-02 (Load cell input)
AD-4820-10 Standard I/O board	32 standard digital input points, 32 open collector output points, 2 pulse input points	
AD-4820-14 Analog output interface board (4 modules can be installed on a board)	Applicable modules	AD-4820-15 (4 − 20mV output) 2 channels per module AD-4820-16 (0 − 10V output) 2 channels per module

Vibratory feeder AD-4826-30G/200G/500G

Model	30G	200G	500G
Maximum capacity	30g	200g	500g
Minimum display	0.01g	0.1g	0.1g
Flow rate setting range	0.1g − 4g / sec.	1.0g − 30g / sec.	5.0g − 40g / sec.
Batch accuracy (standard deviation)	±0.02g or less	±0.2g or less	±0.6g or less

The batch accuracy is the results obtained in a 5-second batch feeding of alumina powder (#100).

Attention to safety!
● Please be sure to read the instruction manuals carefully before use.

*Appearance and/or specifications subject to change for improvement without notice.

Contents of this catalogue last updated November 2007.