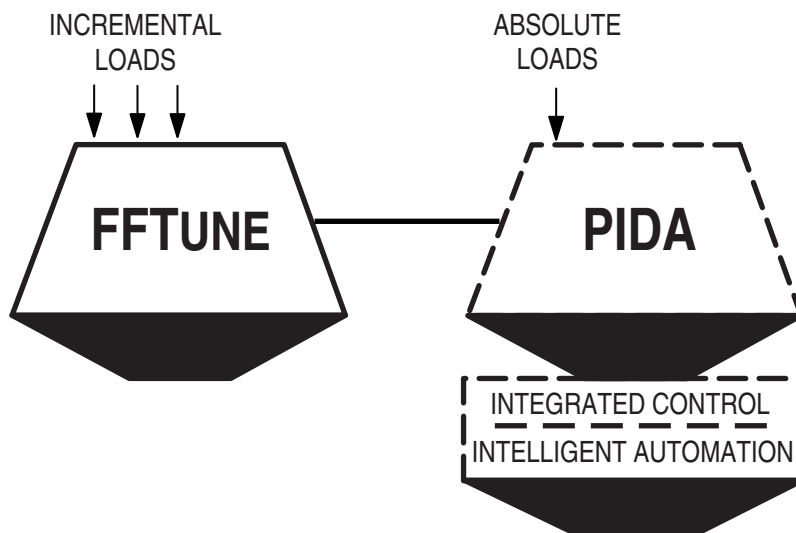


Feedforward Adapter (FFTUNE) Block



The Feedforward (FFTUNE) block performs when there is a need for multiplicative or additive dynamic compensation for measured load signals of the PIDA block or for static and dynamic compensation of incremental loads of the FFTUNE block. The compensators are adaptively tuned when the response is isolated.

OVERVIEW

FFTUNE is an extender block used with the PIDA Controller. FFTUNE contains adaptively tuned feedforward compensators for up to four measured load signals, one of which may be the absolute feedforward input of the PIDA (MULT_IN or BIAS). Other loads are applied directly to the FFTUNE and corrected incrementally.

Adaptation will occur when a natural or deliberate disturbance affects one or more of these loads, provided the error response to the disturbance is

significant and isolated. An isolated response requires a start from a quiet state and a final settling to the quiet state within a response time dependent on the process.

The feedforward self-tuner operates independently from the feedback tuner and needs no pretuner. It uses the method of moments applied to isolated transient responses to identify the first few terms of the series expansion of the Laplace transform for the loads, controller output, and controlled variable. The

projection method is used to find the smallest changes in transfer function model parameters consistent with the last set of signal moments. The model parameters are used to update gain (effective) and delay compensators.

If the process seems to require (unrealizable) negative effective delay, no dynamic compensation is made and the gain compensation is diminished.

If the feedforward compensation is absolute, multiplicative or additive, the compensator gain is not adapted. The gain of a multiplicative compensator is determined by the output of the feedback controller. The gain and sign of an absolute additive compensator is manually settable.

Like the feedback tuner, the feedforward tuner has six sets of stored compensator parameters for each load. Each set is associated with a subrange of a user-selected variable and an initial error-response direction.

When a new response is detected, the most appropriate tuning set is inserted into the controller and updated after the peak search. This provides an adapted gain scheduling or learning to anticipate the behavior of a nonlinear process.

Figure 1 shows FFTUNE training and compensated responses for an incremental and a multiplicative load.

FFTUNE is not available in the CP10.

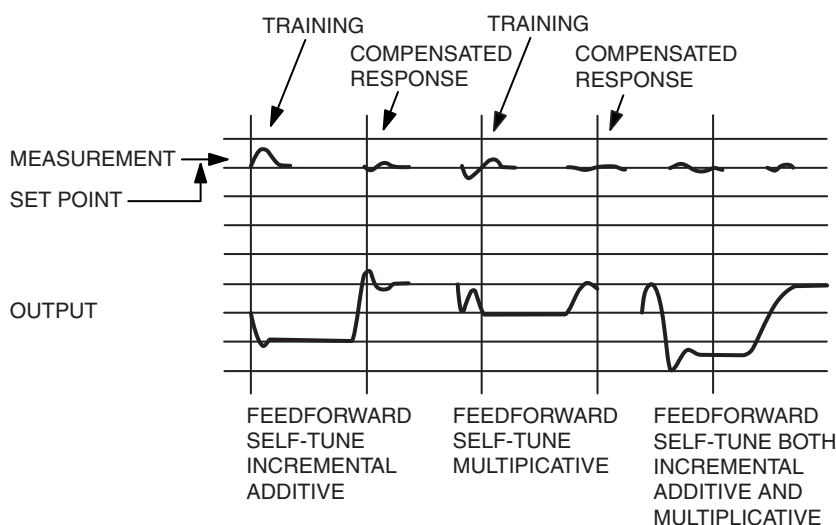


Figure 1. Response of Single Loop Adaptive Multivariable Control with FFTUNE.

PATENT NOTICE

This product and its components are protected by one or more of the following U.S. Patents, and other patents pending:

5,043,863; and corresponding foreign patents.



Invensys Systems, Inc
10900 Equity Drive
Houston, TX 77041
United States of America
<http://www.invensys.com>

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424
Website: <https://support.ips.invensys.com>

Copyright 2014 Invensys Systems, Inc.
All rights reserved.
Invensys is now part of Schneider Electric.

Invensys, Foxboro, Foxboro Evo, and Foxboro Evo logo
are trademarks owned by Invensys Limited, its
subsidiaries and affiliates.
All other trademarks are the property of their respective
owners.

MB 031

0914