azbil

Specification

Control Valve Maintenance Support System

PLUG-IN Valstaff [R 31]

1. Introduction

PLUG-IN Valstaff is a valve management system that detects problems with control valves and positioners at the earliest possible stage by monitoring diagnostic parameters and other information from the Smart Valve Positioner, thereby assisting to avoid accident/failure and helping to streamline maintenance tasks by clearly presenting the information required for decision-making on control valve maintenance.

The PLUG-IN Valstaff monitors diagnostic information 24 hours a day, 365 days a year by communicating with Azbil Corporation's Smart Valve Positioner, which supports FOUNDATION™ fieldbus and HART® communication.

Based on this diagnostic information, at the first sign of an abnormality, the system sends an alert in order to prompt action before the control valve can cause a problem, allowing continuously safe and secure plant operation.

The PLUG-IN Valstaff also supports quick and accurate startup by automating positioner settings that adjust the control valve status, as well as automating step response tests.

It also utilizes diagnostic information for routine maintenance, supporting the creation of an appropriate maintenance plan based on the degree of deterioration of control valves.

2. Function Overview

The PLUG-IN Valstaff, in combination with Azbil Corporation's Smart Valve Positioner, achieves its functions of CV diagnostics parameter monitoring, step response test, and auto-setup by means of integration with a device management system.

2.1 Online Monitoring of CV Diagnostics Parameter in Plant Operation

By collecting diagnostic parameter data from the Smart Valve Positioner and displaying it in a graph during plant operation, the progress of control valve deterioration and the occurrence of abnormalities can be estimated while the plant is operating.

The PLUG-IN Valstaff collects data from the positioner and displays the following diagnostics graphs.

(1) **Total stroke**
Totalizes the operating distances of the valve stem during valve opening position control.

(2) **Shut-off count**
Counts the number of times valves are completely closed and displays the total close counts in chronological order in a graph.

(3) **Cycle count**
Counts the number of times the control valve was reversed and displays them in chronological order in a graph.

(4) **Travel histogram**
Indicates the ratio of the travel value use frequency against total operating time in a particular opening position area.

(5) **Maximum travel speed**
Constantly measures the operating speed of the control valve in both the opening and closing directions, calculates the maximum speed for each day, and then displays the maximum values for opening and closing directions over time.

(6) **Stick-slip diagnostics**
Analyzes stick-slip occurrence trends.

(7) **Deviation**
Collects and compares open position settings to actual control valve open positions, and displays them in a graph.

(8) **Po Validity / Max. Friction diagnostics**
The relationship between output air pressure and Travel is compared against the value obtained during auto-setup as a standard, and displays them in a graph.
(Only Smart Valve Positioner 700 series)

(9) **Air circuit diagnostics**
Calculates the shift amount from the normal value of the drive signal and the nozzle back pressure per day, and displays them in a graph.
(Only Smart Valve Positioner 700 series)

(10) **Supply Pressure**
Displays the maximum value and minimum value of supply pressure per day in chronological order in a graph.
(Only Smart Valve Positioner 700 series)

(11) **Zero Travel Count**
The maximum and minimum travel at the travel cutoff low position are successively updated, and displays the maximum and minimum travel per day in chronological order in a graph.
(Only Smart Valve Positioner 700 series)

(12) **Temperature**
The maximum and minimum temperature according to the temperature sensor are successively updated, and displays the maximum and minimum temperature per day in chronological order in a graph.
(Only Smart Valve Positioner 700 series)

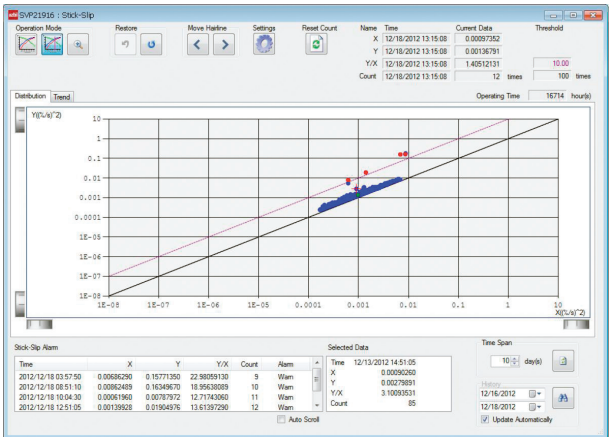

Figure 1. Stick-Slip Diagnostics Screen

2.2 Offline Valve Test

The PLUG-IN Valstaff user can execute Step Response Test and Valve Signature Test for control valves in plant shutdown.

(1) **Step Response Test**

The PLUG-IN Valstaff user can execute a step response test for control valves when plant is in shutdown maintenance.

The results, which are displayed in a graph, can be used to detect deterioration or other problems in the control valve based on changes in response waveforms compared with other timing test results of the same test pattern.

In addition, quantitative dynamic characteristics data such as time constant, delay time, and settling time, which are obtained from the test result, are helpful for performance evaluation of the control valve.

The user can be automatically executed this test for multiple control valves.

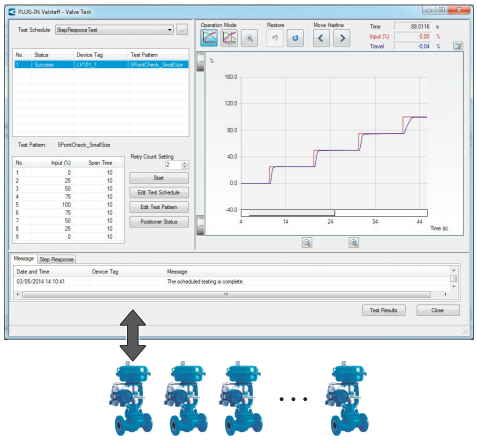

Figure 2. Step Response test Screen

(2) **Valve Signature Test**

The PLUG-IN Valstaff user can execute Valve Signature Test to diagnose the control valve from characteristics between actuator pressure and valve opening. The result, which are displayed in the graph, can be used to detect deterioration or other problems in the control valve.

The user can be automatically executed this test for multiple control valves.

(Only Smart Valve Positioner 700 series)

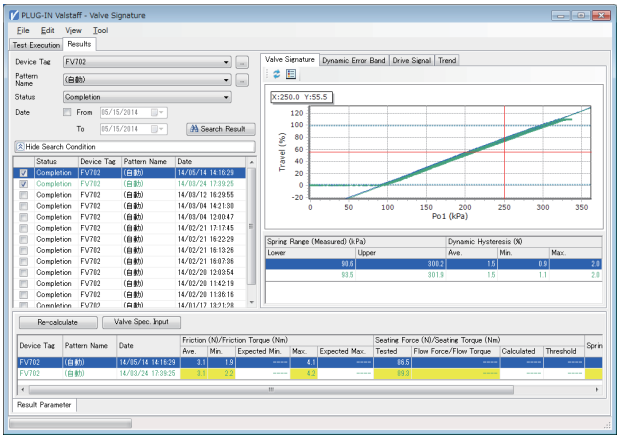

Figure 3. Valve Signature Screen

2.3 Auto-setup

The PLUG-IN Valstaff's auto-setup function automatically adjusts the positioner.

The behavior of a control valve during auto-setup can be monitored during the error-checking portion of the automatic adjustment process.

Also, the stroke time and hysteresis data collected during auto-setup can be compared with the past test data.

This comparison provides an easy way to judge deterioration and the occurrence of abnormalities in the control valve.

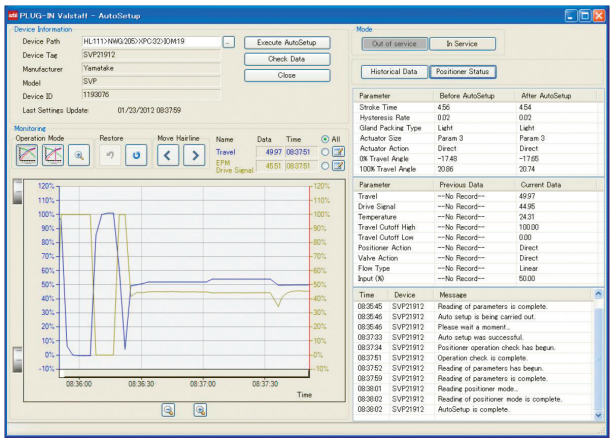

Figure 4. Auto-setup Screen

3. System Configuration

The PLUG-IN Valstaff works in conjunction with the Innovative-Field Organizer (IFO) device management system made by Azbil Corporation or with the PRM® (Plant Resource Manager) made by Yokogawa Electric Corporation.

3.1 With Advanced-PS (TDCS3000)

By operating the PLUG-IN Valstaff on IFO, it is possible to manage control valves with a HART communication-compatible Smart Valve Positioner AVPx02.

For details on system configuration, refer to the spec sheet for IFO (SS2-IFO310-0001).

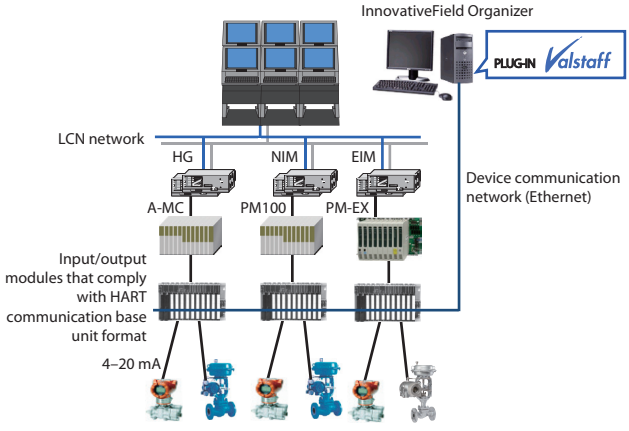

Figure 5. PLUG-IN Valstaff Configuration for Advanced-PS/TDCS3000

3.2 With Harmonas-DEO R410

By operating the PLUG-IN Valstaff on IFO, it is possible to manage control valves with a Smart Valve Positioner AVPx02, AVPx03 by using HART communication or FOUNDATION fieldbus.
For details on system configuration, refer to the spec sheet for IFO (SS2-IFO310-0001).

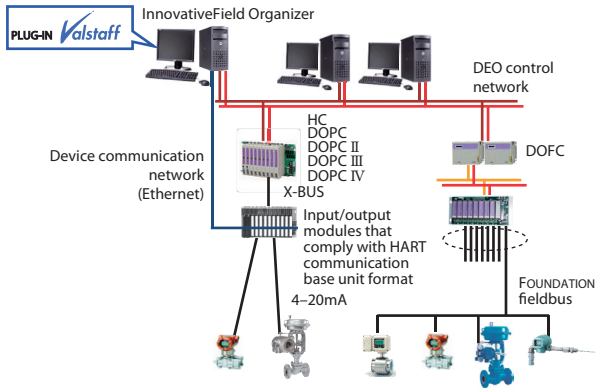

Figure 6. PLUG-IN Valstaff Configuration for Harmonas-DEO R410

3.3 With Harmonas-DEO except for R410

By operating the PLUG-IN Valstaff on IFO, it is possible to manage control valves with a Smart Valve Positioner by using HART communication.
For details on system configuration, refer to the spec sheet for IFO (SS2-IFO310-0001).

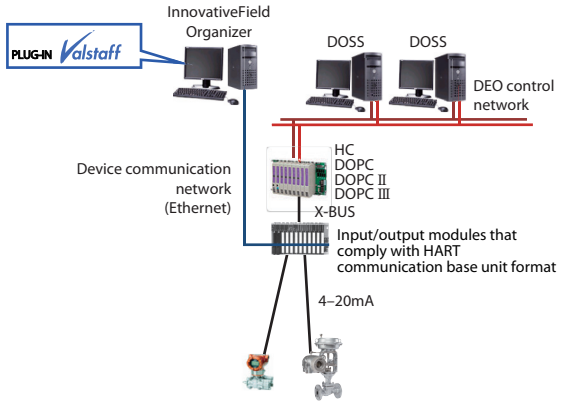

Figure 7. PLUG-IN Valstaff Configuration for Harmonas-DEO R400 or earlier

3.4 IFO system configuration which is independent from DCS

The PLUG-IN Valstaff can be used in conjunction with IFO independent from DCS by using HNU (HART Network Unit). In this case, the PLUG-IN Valstaff can manage control valves with HART communication-compatible Smart Valve Positioner AVPx02.
For details on system configuration, refer to the spec sheet for IFO (SS2-IFO310-0001).

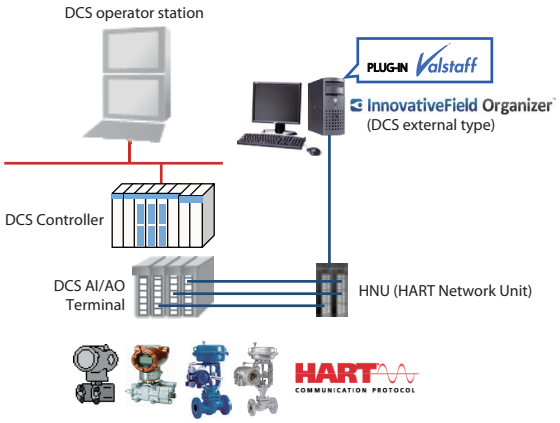

Figure 8. IFO system configuration which is independent from DCS

3.5 When Combined with Yokogawa Electric Corporation's PRM

The PLUG-IN Valstaff control valve maintenance support system can be used in conjunction with Yokogawa Electric Corporation's Plant Resource Manager (PRM).

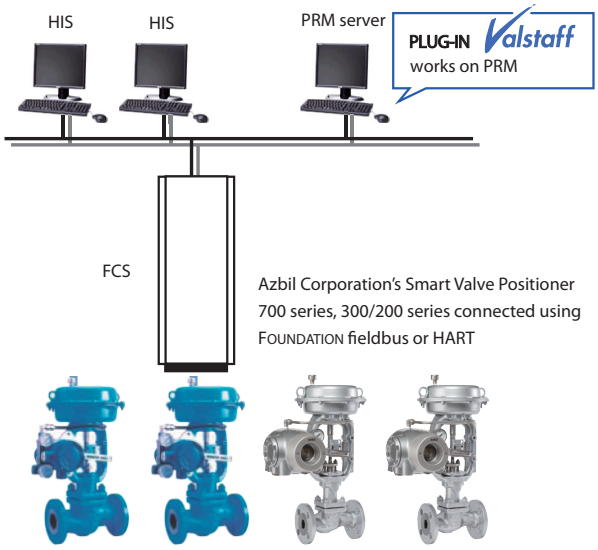

Figure 9. PLUG-IN Valstaff configuration on PRM Server

4. System Specifications

4.1 Maximum Number of Connected Smart Valve Positioners

The maximum number of positioners that can be managed by the PLUG-IN Valstaff is shown below. It is dependent on the communication protocol.

System	Communication protocol	Maximum number of managed units
Azbil Corporation's device management system IFO	HART	500*1
	FOUNDATION fieldbus	
Yokogawa Electric Corporation's PRM	HART	500*1
	FOUNDATION fieldbus	

*1: *The sum of* FOUNDATION *fieldbus devices and* HART *devices.*

4.2 Application Specifications

・With IFO

Diagnostic parameter update interval		Stick-slip diagnostics:	400 s
		Total stroke:	1 day *3
		Maximum travel speed:	1 day *3
		Total shut-off count:	1 day *3
		Cycle count:	1 day *3
		Po Validity / Max. Friction diagnostics:	1 day *3 *5
		Air circuit diagnostics:	1 day *3 *5
		Supply Pressure:	1 day *3 *5
		Zero Travel Count:	1 day *3 *5
		Deviation:	1 day *3 *5
		Temperature:	1 day *3 *5
		Travel histogram:	1 month
		Set Point(from DCS OP) and Valve opening:	4 s
Data sampling interval for CV step response test	FOUNDATION fieldbus communication	AVP703	Fastest 50 ms
		AVP303	83.3 ms
	HART communication	AVP702	Fastest 50 ms
		AVP302/202	83.3 ms
Device condition monitoring interval		Fastest 1 s *3	

・With PRM

Diagnostic parameter update interval		Stick-slip diagnostics:	400 s *2 *3
		Total stroke:	1 day *3
		Maximum travel speed:	1 day *3
		Total shut-off count:	1 day *3
		Cycle count:	1 day *3
		Po Validity / Max. Friction diagnostics:	1 day *3 *5
		Air circuit diagnostics:	1 day *3 *5
		Supply Pressure:	1 day *3 *5
		Zero Travel Count:	1 day *3 *5
		Deviation:	1 day *3 *5
		Temperature:	1 day *3 *5
		Travel histogram:	1 month
		Set Point(from DCS OP) and Valve opening:	4 s *2 *3
Data sampling interval for CV step response test	FOUNDATION fieldbus communication	AVP703	Fastest 50 ms
		AVP303	83.3ms *2
	HART communication	AVP702	Fastest 50 ms
		AVP302/202	Fastest 5 s *4
Device condition monitoring interval		300 s *3	

*2: *In the case of running on PRM, data sampling interval might be delayed by communication performance constraint.*

*3: *Interval may require adjustment depending on the number of valve positioners connected.*

*4: *It becomes not step response test but simplified valve test by communication performance constraint.*

*5: *Only Smart Valve Positioner 700 series*

4.3 Target Smart Valve Positioner

・Smart Valve Positioner 300/200 series

Model number	Internal software version
Model AVP302	Ver. 3.D or later (Field device revision 2 or later)
Model AVP202	
Model AVP303	Ver. 2.1 or later
Model AVP203	

・Smart Valve Positioner 700 series

Model number	Internal software version
Model AVP702	Ver. 2.1 or later
Model AVP703	Ver. 2.5 or later

For detailed Smart Valve Positioner specifications, refer to the spec sheet for each product shown below.

Model AVP302: SS2-AVP302-0100
Model AVP202: SS2-AVP202-0100
Model AVP102: SS2-AVP102-0100
Model AVP303/203: SS2-AVP303-0100
Model AVP702: SS2-AVP702-0100
Model AVP703: SS2-AVP703-0100

5. Operating Environment

The PLUG-IN Valstaff works on Azbil Corporation's IFO or Yokogawa Electric Corporation's PRM R3.10 or later.

System/software package	Operating System
InnovativeFied Organizer R31	Windows 7 Professional Service Pack 1 (32-bit/64-bit)
PRM R3.05.01	Windows XP Professional Service Pack 1 (32-bit)
	Windows Server 2003 Service Pack 2 (32-bit)
	Windows Server 2003 R2 Service Pack 2 (32-bit)
	Windows Vista Business Edition Service Pack 1 (32-bit)
	Windows Vista Business Edition Service Pack 2 (32-bit)
	Windows Server 2008 Standard Edition Service Pack 2 (32-bit)
RPM R3.10/R3.11 /R3.12	Windows Vista Business Edition Service Pack 2 (32-bit)
	Windows Server 2008 Standard Edition Service Pack 2 (32-bit)
	Windows Server 2008 Standard Edition R2 Service Pack 1 (64-bit)
	Windows 7 Professional Edition Service Pack 1 (64-bit)

6. License System

・PLUG-IN Valstaff base license

	Model number	Description
License for number of device connection	FNV-IFV3xE01	PLUG-IN Valstaff R3x License 16 TAG entry edition
	FNV-IFV3xE02	PLUG-IN Valstaff R3x License 25 TAG
	FNV-IFV3xE05	PLUG-IN Valstaff R3x License 50 TAG
	FNV-IFV3xE10	PLUG-IN Valstaff R3x License 100 TAG
	FNV-IFV3xE20	PLUG-IN Valstaff R3x License 200 TAG
	FNV-IFV3xE30	PLUG-IN Valstaff R3x License 300 TAG
	FNV-IFV3xE50	PLUG-IN Valstaff R3x License 500 TAG

・PLUG-IN Valstaff DMS (Device Management System) connection license

	Model number	Description
License for DMS connection	FNV-IFV3xE-A	PLUG-IN Valstaff R3x DMS connect license for IFO
	FNV-IFV3xE-B	PLUG-IN Valstaff R3x DMS connect license for RPM

7. External storage

Automatic backup and external storage is available for control valve diagnostic data collected by PLUG-IN Valstaff operating in IFO.
For automatic back-up, after conferring with the client, we can use the external storage options listed below. When using PLUG-IN Valstaff operating in PRM, please use the large-capacity storage method recommended by PRM.

- Imation Corporation
  RDX Removable HDD Storage System USB3.0/RDX HDD Media

Imation Corporation's web site: http://www.imation.com/en-US/

CAUTION

When using external storage for automatic back-up, keeping your PC safe is a necessity. However, please do not install anti-virus software on the PC used for IFO. Instead, do virus-checking remotely from another PC.

- Also, if an external storage device whose operation we have not checked is used, Azbil Corporation cannot guarantee its operation or the integrity of the data. If the lack of a guarantee is acceptable and an external storage device which we have not checked is used, please use a device that meets the following conditions at a minimum.
- Device does not require special software (do not install software other than Azbil products on the PC used for IFO).
- Device does not incorporate a security function.

About icons for safety precautions

The safety precautions described in this document are indicated by the following icons.

⚠ WARNING	Warnings are indicated when mishandling this product might result in death or serious injury.
⚠ CAUTION	Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to the product.

■ **Example**

⃠	The indicated action is prohibited.
❗	Be sure to follow the indicated instructions.

Safety precautions

⚠ CAUTION	
❗	Before wiring, be sure to shut off the power to all devices that require power shutoff during wiring. Failure to do so may cause device failure.
⃠	If an explosion-proof field device is used, never open its cover while it is running (while power is supplied). Doing so may result in an electric shock. For handling of this type of device, see the user's manual for the device.
❗	Back up data and check for viruses regularly. Failure to do so may result in corrupted data or program malfunction.
⃠	Do not install any anti-virus software into this PC. Check for viruses remotely from another PC.
⃠	Do not connect the PC upon which the PLUG-IN Valstaff application software is to be installed to an external network such as the Internet or a corporate intranet. If the PC is infected by a virus, the collected data may be corrupted or a program may malfunction.
⃠	Do not install any applications except those listed below on the PC upon which the PLUG-IN Valstaff application software is to be installed. • Device management system and associated software • PLUG-IN Valstaff application software • Driver for the USB hard disk drive used for data backup and loading (if necessary) Please keep in mind that Azbil Corporation's warranty does not cover any failures resulting from installation of any other applications.
❗	Before executing offline diagnostics, inform operators in the vicinity of control valves that the diagnostics will make the valves open and close regardless of signals from the controller. Unexpected valve opening or closing can injure operators.
❗	Before executing full stroke tests, inform operators in the vicinity of control valves that the tests will make the valves open and close regardless of signals from the controller. Unexpected valve opening or closing can injure operators.
❗	Before calibrating or adjusting the positioner, changing settings, or performing other related operations, check that the intended operation will not affect the operation of the plant and change the mode to "out of service."
❗	Before executing AutoSetup, inform operators in the vicinity of control valves that AutoSetup will open the valves from the fully closed position to the fully open position. Unexpected valve opening or closing can injure operators.
❗	When connecting the hard disk drive to another PC, perform a virus check before reconnecting it to the device management system.

Please read the "Terms and Conditions" from the following URL before ordering or use:

http://www.azbil.com/products/bi/order.html

Specifications are subject to change without notice.

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