Integration between DeltaV™ and Intergraph Smart Instrumentation

This whitepaper provides an overview of the interface between DeltaV and Intergraph's Smart Instrumentation.

DELTAV™

EMERSON™

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Introduction

The Intergraph Smart Instrumentation software, formerly known as either SmartPlant Instrumentation (SPI) or INtools, is an engineering and design environment from the **Hexagon Corporation** and it is used by many engineering contractors and owner/operators for instrumentation design. Projects that use Intergraph Smart Instrumentation in combination with the **DeltaV** digital automation system will benefit from the data exchange interface that has been developed. This interface allows for the seamless exchange of I/O data and instrumentation information between the two databases. Hexagon uses INS to abbreviate Integraph Smart Instrumentation and that is how this software is referenced through this whitepaper, however there are still some references to the previous software name: SmartPlant Instrumentation (SPI), specially when describing software compatibility.

During the project design stage, it is a common practice to take data from INS to create the I/O and instrument data in the automation system. However, during the plant operation stage, changes may be first entered into the automation system's database and this data can be used to configure INS. The DeltaV-INS interface was designed to transfer data in either direction.

The DeltaV system has a bi-directional, file-mode transfer interface to INS, jointly developed by Emerson and Intergraph, and based on Intergraph's modular architecture. The information that can be transferred spans both conventional I/O, CHARMs I/O, HART, and Fieldbus I/O systems. The INS product has been enhanced to allow DeltaV definitions for I/O hardware objects, DeltaV terminology, and FOUNDATION™ Fieldbus device definitions to appear directly in INS.

The DeltaV-INS interface integration capability is built into the DeltaV system architecture, and is an inherent part of the DeltaV system media for each software release. Emerson is a member of Intergraph's SmartPlant Alliance Program, providing continued commitment to this interface by both parties.

The following diagram shows where the interface fits into the project workflow (some activities not shown).
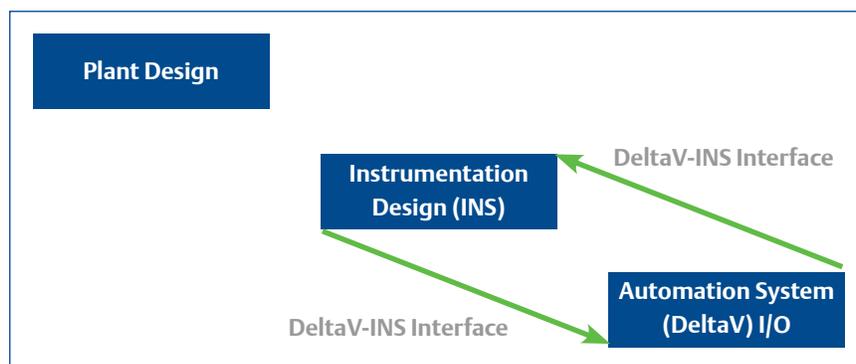

Figure 1 — Project workflow diagram.

Benefits of Using the DeltaV—INS Interface

- Reduced DeltaV engineering hours: The DeltaV I/O configuration is exported from INS and imported into the DeltaV system. This process eliminates the need to define the I/O from scratch on the DeltaV side. Typical savings of 10-15% of DeltaV configuration time can be expected, depending on whether there is Fieldbus device content in the project.

- Reduced INS database setup hours: DeltaV I/O components and FOUNDATION Fieldbus device definitions are imported into INS saving hours of setup work.

- Standardizes the way that the DeltaV-related data is captured in INS.

- Higher quality project deliverables because shared data is entered once. No data conversion or transfer errors caused by manual processes.

- Easier and faster to propagate scope changes from one database to the other.

- Reduced maintenance and operation costs: Easy to keep databases synchronized so that as-built documentation is current.

Details of the Interface

The diagram below provides an overview of the workflow that is supported by the interface:
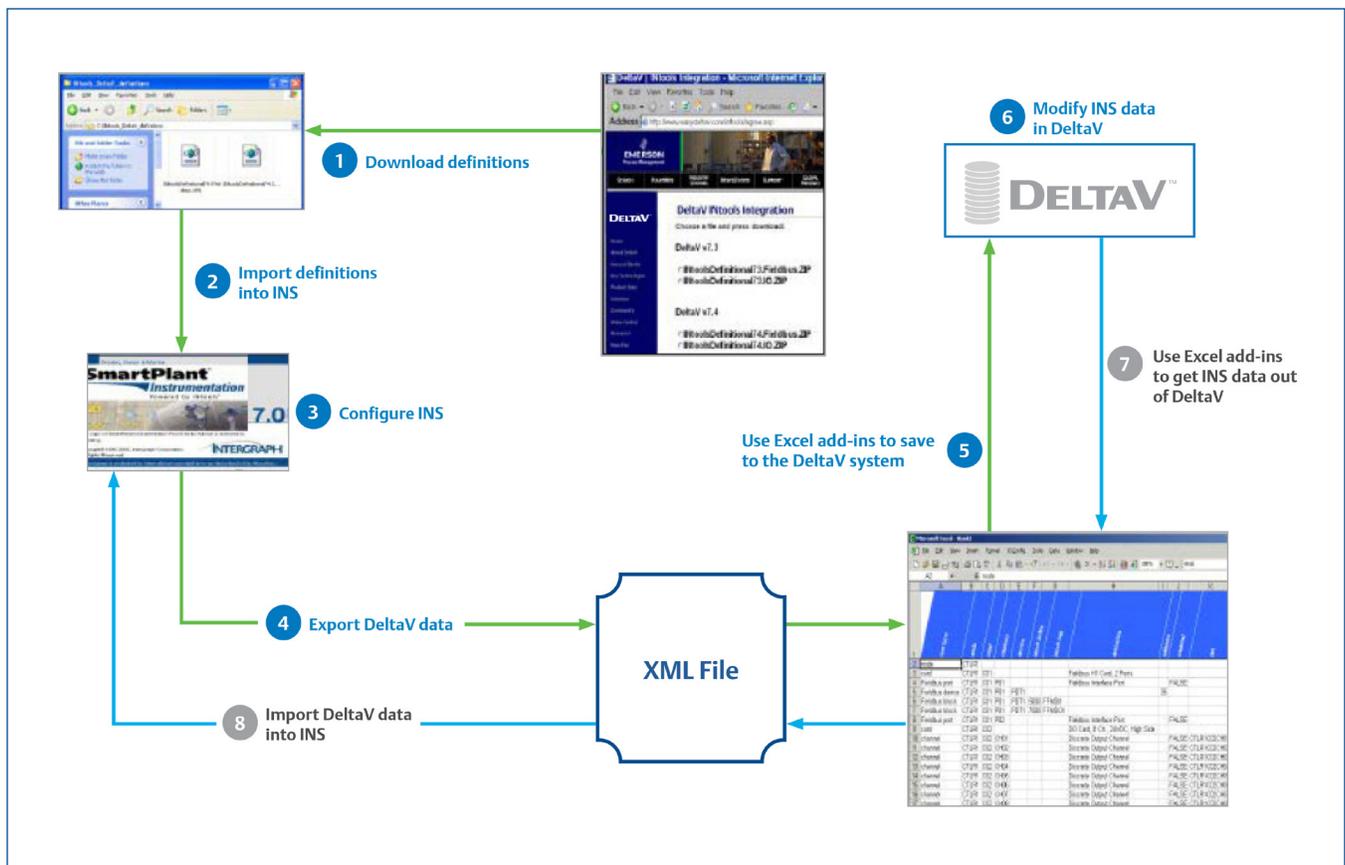
Figure 2 — DeltaV—INS workflow.

The first step is to prepare INS for working with the DeltaV system. This involves importing the DeltaV object definitions since INS does not contain the DeltaV object definitions when shipped. These defintions must be downloaded from:

https://connect.hexagonppm.com/DownloadDeltaVDefinitionFiles

Figure 3 — Form for downloading DeltaV definition files.

Figure 4 — DeltaV definitional file download site.

The definitions are updated by Emerson when new I/O objects are introduced into the DeltaV system. This allows the INS library to be kept current with the latest DeltaV definitions. Once the defintions are imported, the DeltaV I/O card types will appear in the INS Reference Explorer, as if they were standard INS panels. The definitions for the I/O cards provides information such as card type, allowed channel types and terminal arrangements. Another benefit of importing these definition files is that INS will be setup with FOUNDATION Fieldbus device definitions. The files provide information such as manufacturer, model, revision and function blocks supported by a given device revision. Automatic population of this data is a big productivity improvement for INS users versus defining all the information manually.

INS is also setup to group information according to DeltaV controller names to improve the data transfer process.
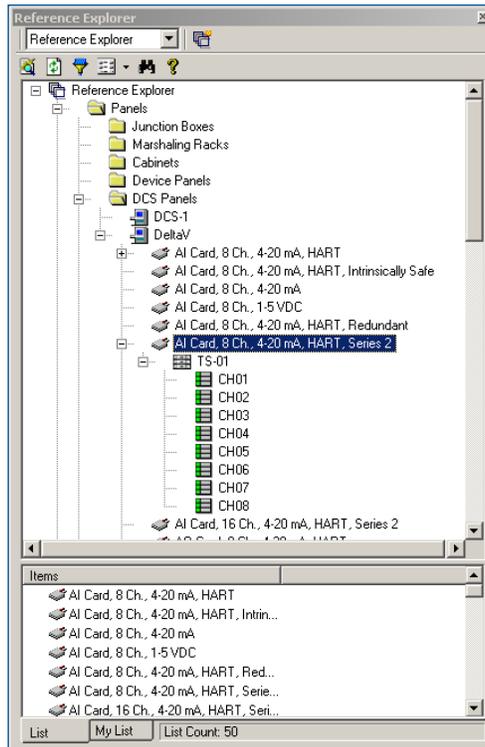
Figure 5 — DeltaV definitions loaded into INS.

After the DeltaV definitions are imported, they can be used as if they are standard INS database objects. The DeltaV I/O cards can be configured and the I/O channels can be bound to instrument tags. INS will also allow the name of the DeltaV controller to be specified. If this controller does not exist in the DeltaV database, it will be created when the data is saved to the DeltaV system. INS has detailed help in the topic Crucial Fields for the DeltaV-INS Interface available on how to correctly configure the DeltaV items.
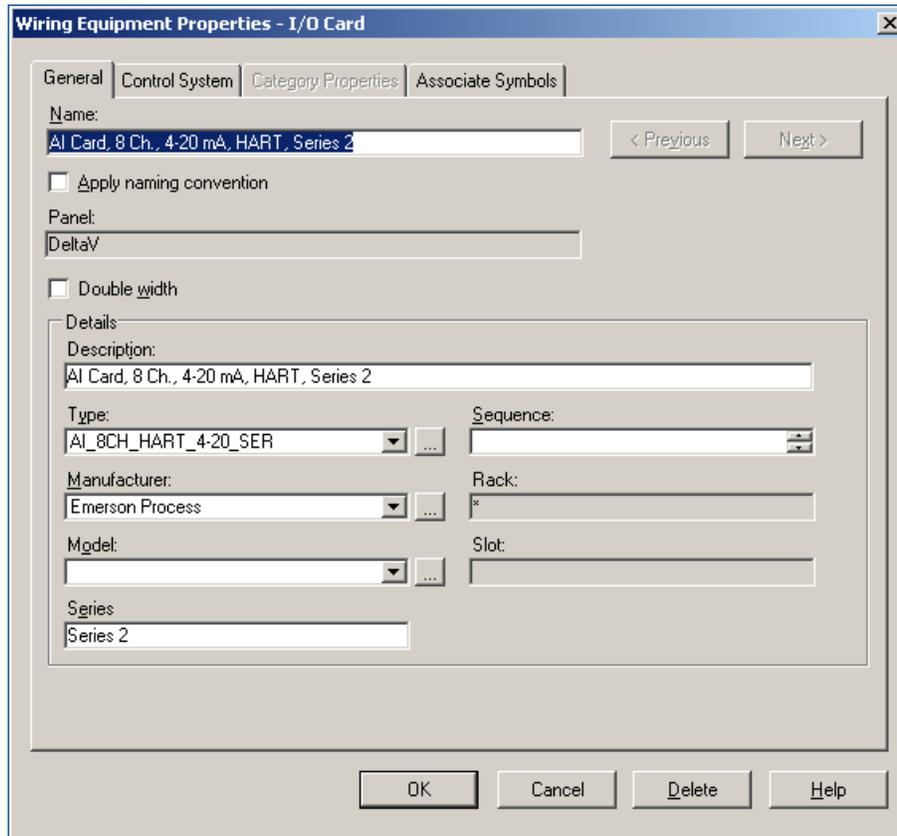
Figure 6 — A DeltaV I/O card being configured in INS.
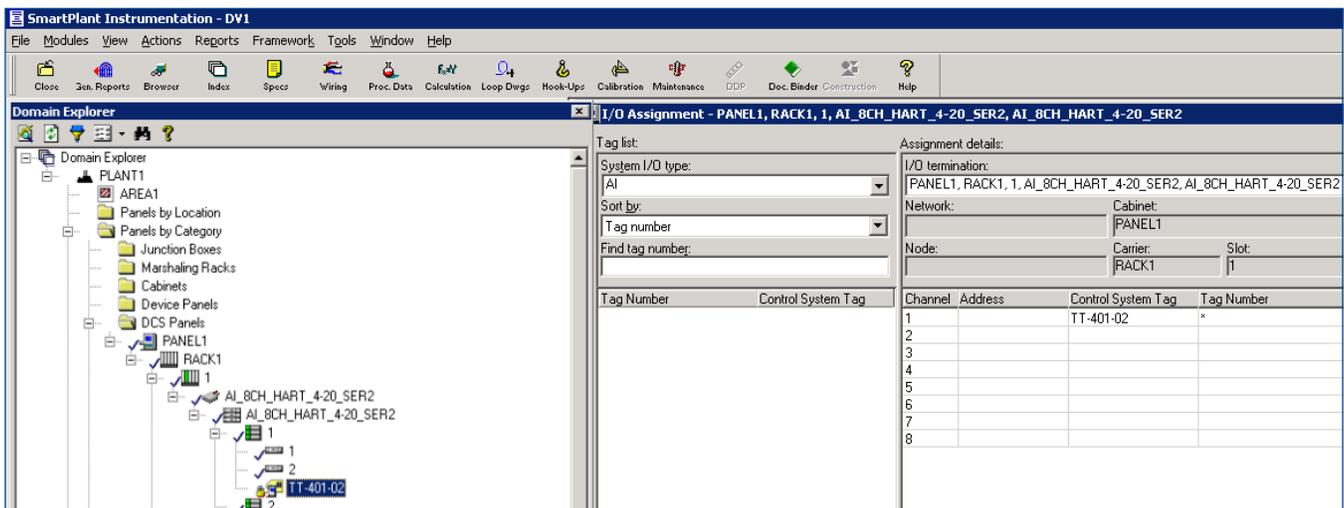
Figure 7 — I/O Assignment to DeltaV card/channel in INS.

From one menu in INS all the relevant data from the various INS configuration modules will be collected and exported into one file. The data for each DeltaV controller is exported in a separate file.
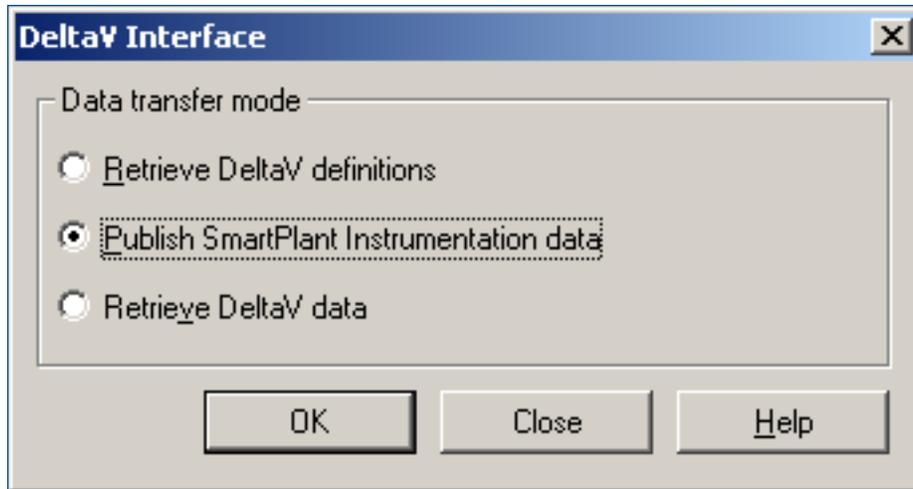
Figure 8 — Exporting INS data to the DeltaV system.

An Excel add-in is provided with the standard DeltaV installation to process the INS data. This add-in can load an .XML file export from INS and save the data to the DeltaV database. The add-in detects and highlights errors in the data.
It also compares the data in the spreadsheet to data that may already exist in the DeltaV database and highlights the differences. The user can preview the data and even compare the data to corresponding entries in the database. Finally, a log file for each data transfer is created as a detailed record of the data exchanged between INS and the DeltaV system.

In the DeltaV v10.3 and later releases, this Excel add-in is also used to transfer data from the DeltaV system to INS. An example Excel worksheet, with the add-ins enabled and populated with data from INS, is shown below in Figure 9.
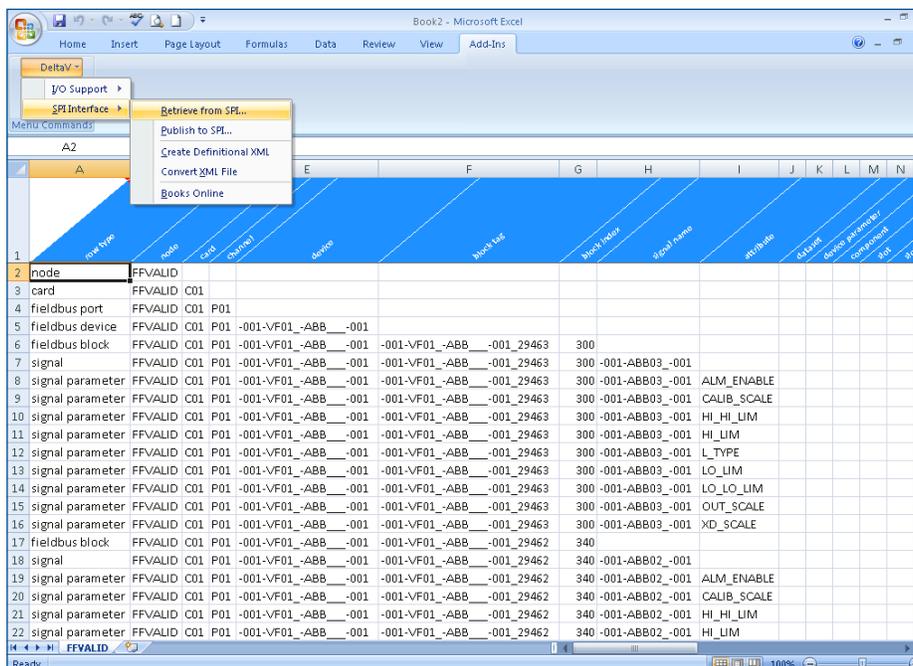
Figure 9 — INS add-in for the DeltaV system.

As mentioned, when configuration changes are made in the DeltaV system, the data can be published from the DeltaV database to an .XML file using the the Excel add-ins supplied with each DeltaV system. The DeltaV data contained in the .XML file can be retrieved in INS using the DeltaV Interface menu in the INS. Inside the INS application, the data from the DeltaV system can be reconciled with the data already in the INS database using the To Do List functionality in INS. The To Do List gives the INS user control of "if" and "when" the data in INS should be updated with the changed/added data from DeltaV. Figure 10 below shows an example of the INS To Do List.
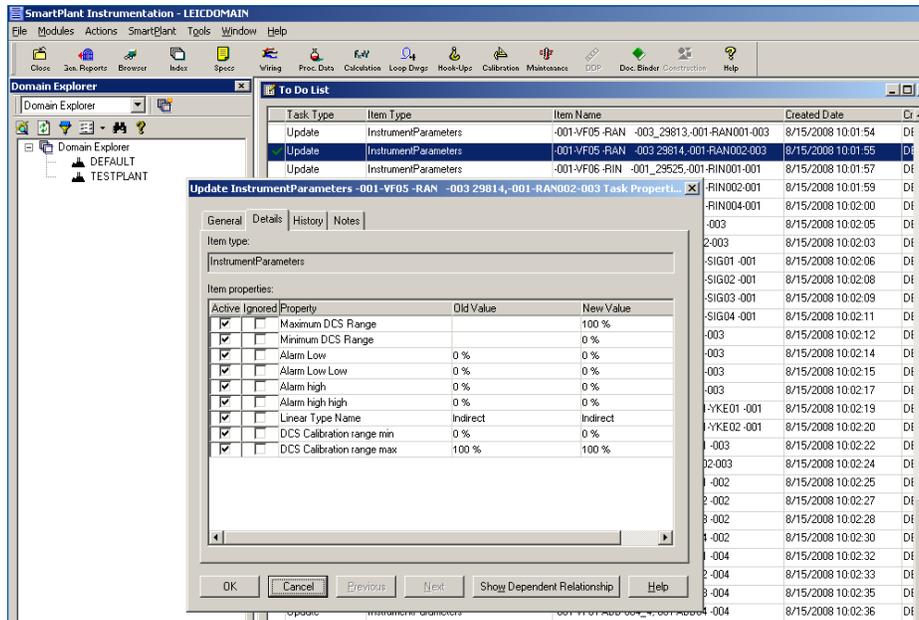
Figure 10 — INS To Do List.

Types of Data Exchanged

- The interface for use with DeltaV v10.3 and SPI v2007 SP6 supports bi-directional transfer (DeltaV←→SPI) of configuration data for:

  - DeltaV controllers

  - I/O card types and binding to DeltaV controller

  - I/O channel types

  - Control system tags device signal tag (DSTs) and binding to I/O channels

  - Fieldbus device tags and properties

  - Fieldbus device function block tags

  - Instrument signal data (ranges, engineering units, alarm limits)

  - HART device properties (manufacturer, type, revision, device tag)

- The interface for use with DeltaV v11.3 and SPI v2009 SP3 adds data transfer of CHARMS configuration data from SPI to DeltaV (in addition to the bi-directional transfer functionality provided in DeltaV v10.3).

- The interface for use with DeltaV v12.3 and SPI v2009 SP4 supports bi-directional transfer (DeltaV←→SPI) of CHARMS configuration data.

NOTE: Neither LS CHARMS or the smart logic solver SLS1508 are supported by the DeltaV-INS interface. PK Controller is not supported by the interface either.

- In more detail, publishing data from INS creates and configures the following data:

  - For Controllers, create the node with:

    - Name

    - Description

    - Redundancy (Redundant or Simplex)

  - For DeltaV Classic I/O Cards, create the card with:

    - Slot position (Card number in rack)

    - Type and Series (e.g. AO 8CH HART 2-20 SER2)

    - Redundancy (Redundant or Simplex)

  - For DeltaV Classic I/O Channels, create the channel with:

    - Type (Definition)

    - Enabled (True or False)

    - DST (Tag name)

    - Description

  - For DeltaV Fieldbus I/O Cards, create the card with:

    - Slot position (Card number in rack)

    - Series (Series 1 or Series 2)

    - Redundancy (Redundant or Simplex)

    - Description

  - For DeltaV Fieldbus Ports, create the port (segment) with:

    - Enabled (True or False)

    - Description

  - For Devices, create the device with:

    - Device manufacturer

    - Device type

  - For HART Devices, create the device with:

    - Manufacturer

    - Type (i.e. HART device)

    - Revision (Device revision)

    - Device tag (Tag name)

- For Fieldbus Devices, create the device with:

  – Port number

  – Device tag (Tag name)

  – Address

  – Description

  – Manufacturer

  – Type (i.e. Fieldbus device)

  – Revision

  – Backup Link Master (True or False)

  – PlantWeb Alerts Enabled (True or False)

- For Fieldbus Function Blocks, create the FF function block with:

  – Tag (Block tag name)

  – Block index

  – Description

- For Signals, create the instrument signal with:

  – Enabled (True or False)

  – Description

- For Signal Parameters, creates the following instrument signal parameters

  – Signal name

  – Value

  – EU 0 (0% of scale)

  – EU 100 (100% of scale)

  – Engineering unit

- For CHARM I/O Cards (DeltaV v11 and later), create:

  – Name

  – Description

  – Enable Primary Cascade Port

- For DeltaV CHARM, create the CHARM with:

  - Slot position (CHARM name in rack e.g. CHM2-06)

  - Type (e.g. AO 4-20 mA HART CHARM)

  - CHARM Functionality

  - Description

  - Enabled (True or False)

  - DST (Tag name)

  - HART Long Tag

  - Cabling ID (Retrieve from SPI only)

Minimum Software and Licensing Requirements

Capabilities	Mininum Software Requirements for DeltaV	Mininum Software Requirements for SPI
Bi-directional interface (excluding CHARMS)	DeltaV v10.3 or later	SPI v2007 SP6 or later
Uni-directional interface for CHARMS	DeltaV v11.3 or later	SPI v2009 SP3 or later
Bi-directional interface capabilities (including CHARMS)	DeltaV v12.3 or later	SPI v2009 SP4 or later

NOTE: The table still reference the previous software name: SmartPlant Instrumentation (SPI)

- SPI Excel add-ins are supplied with the standard DeltaV software media pack.

- OPC Excel add-in is not required.

- Excel 2003 SP3 (Excel 2007 SP1 also supported).

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