

User's Guide to the AALBORG DPM/DPC LabVIEW Drivers

The screenshot displays the LabVIEW driver interface for the Aalborg DPM/DPC. It is organized into several functional panels:

- Serial Configuration:** Shows the serial port (COM3), baud rate (38400), and RS-485/RS-232 address (11).
- Set Point Options:** Includes a setpoint value of 50.000 %FS, setpoint source (Digital), and valve mode (Auto).
- Totalizer#1 Options:** Shows Totalizer #1 is enabled, with start @ flow at 2 %FS, action volume at 0.5 %s, and current volume at 686.55 %s. It also includes checkboxes for valve action and auto reset/reload, and delay settings for auto reset (1s) and power up (10s).
- Flow Alarm:** Shows the flow alarm is enabled with a status of 'D'. It includes high and low alarm limits (15 %FS and 10 %FS), a flow alarm latch, and action/power up delays (0s and 6s).
- Process Information:** Displays real-time data: Set Point (50.000 %FS), Valve Counts (N/A), Mass Flow (50.03 %FS), Volum. Flow (51.20 %FS), Totalizer #1 (686.55 %s), Totalizer #2 (4350.85 %s), Gas Temp. (24.16 C), and Gas Pressure (14.51 PSIA).
- Measuring Units:** Allows selection of units for Mass Flow (%FS), Vol. Flow (%FS), Pressure (PSIA), and Temperature (Celsius).
- SS Relay Assignment:** Shows the relay is disabled with 0-5 Vdc output and input.
- PI Logging Options:** A checklist for logging various parameters like Set Point, Valve Counts, Mass Flow, Totalizers, Gas Temperature, and Alarm Events. Includes a 'Log Data' button.
- User Defined Gas Mixture input:** Allows defining a gas mixture with 5 gases (all set to Air), ratios, and enable flags. Includes a 'Create Mixture' button.
- Alarm Events:** A grid of checkboxes for various alarm events such as High/Low Flow, Pressure, Temperature, and Pulse Output, with 'Reset', 'E/D', and 'Latch' options.
- Register Values:** Includes a 'Read Register' button and a display showing '0'.
- Graph:** A multi-axis plot showing Flow, Temperature, and Pressure over time. The left y-axis is Flow (0.00-125.00), the inner right y-axis is Temperature (0.00-60.00), and the outer right y-axis is Pressure (0.00-100.00).
- Bottom Status Bar:** Provides device details: Device Function (Controller), Model Number (DPC17A-VAL6-A2), Serial Number (999001-2), Selected Gas (0,Air), Full Scale Range (0.00050 sl/min), Mass EU (%FS), Volum. EU (%FS), T1 (D), T2 (E), A Output (0-5Vdc), A Input (0-5Vdc), Modbus (No).



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1. Introduction

The AALBORG DPM/DPC LabVIEW drivers were designed to make communication with DPM and DPC instruments using LabVIEW much easier, and include all supported ASCII commands which are organized as easy to use sub-VI's. These drivers will work on any DPM and DPC instrument that is configured for RS-232 or RS-485 interface and connected to the instrument's digital communication interface (round 3.5mm jack connector on the instrument's top cover). This driver will not work when instrument is connected to optional Modbus communication protocol (RJ45 connector on the instrument's top cover).

In the most basic form, the DPM/DPC LabVIEW drivers are establishing a VISA session to an active COM port to which DPM/DPC devices are connected. Once the communication has been initialized, the sub-VI's can be called which send serial ASCII commands to the DPM/DPC instruments over the opened VISA session and parse the ASCII data string that is returned from the device. The initialization should be done with the **Init COM Port** sub-VI, and the VISA session should be closed using a **VISA Close** VI (included in LabVIEW) when ending the program. In the following pages, each of the VI's included in the DPM/DPC LabVIEW driver set has a brief description of the function and of the input and output terminals. When operating multiple devices on a single COM port (using RS-485 interface), each serial command or sub-VI must be called sequentially. This can be achieved by ensuring that a VISA session wire on the block diagram always has one source and one sink, and does not branch to multiple sinks. This applies to a single VISA session wire on the block diagram associated with a given COM port, multiple DPM/DPC instruments can be operated in parallel through the use of multiple COM ports (and each of those VISA sessions' wires should not branch to multiple sinks).

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2. Known Issues

The string-to-number conversions performed in the data parsing VI's uses the system default decimal format. In some regions, this can cause issues due to LabVIEW expecting a comma for a decimal point instead of the period that will be present in the DPM/DPC instrument reply data frame.

To overcome this issue, one can either change the Windows localization settings to use a period for the decimal point or the sub-VI's that are causing the errors can be edited to fix the issue. For the string-to-number sub-VI's, there should be an input for "use system decimal" that can be set to false to force a period to be used; for the "scan from string" sub-VI, changing the format specifier from %f or %.3f to %.;%f or %.;%.3f should work.

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3. AALBORG DPM/DPC VI Tree

The AALBORG DPM/DPC VI Tree's block diagram contains all of the VI's included in the driver library, visually organized by category. To view these files, simply view the block diagram. When viewing the block diagram, you can hover over the VI's with the context help active to view the description of the VI.

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4. Sub-VI's

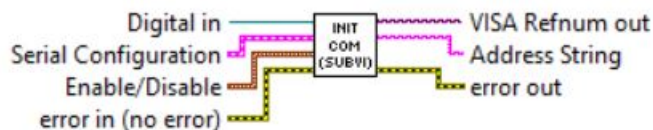
4.1 Initialization

These sub-VI's are used to open a VISA session with the configuration settings required by DPM/DPC instruments and to populate the global arrays with data from corresponding text files. The global arrays are used to initialize some controls (combo box and ring controls for units of measure and selected gas) used in this driver examples program.

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4.1.1 Init COM Port

Init COM Port (SubVI).vi



Initializes the serial connection to a selected COM port. Baud rate should match the baud rate of the connected DPM/DPC instrument. If multiple instruments are connected to the same COM port, ensure that DPM/DPC instruments configured for RS-485 interface and they all have unique RS-485 Addresses.

Inputs:

Serial Configuration is a cluster that contains the Instrument Address (two hexadecimal characters), Baud Rate, Interface Type (boolean TRUE for RS-485) and COM Port Number used for establishing communication with device. NOTE: Address is not required when instrument is connected over RS232 interface (in this case interface type should be set to RS-232 which is boolean "FALSE").

Digital In is reference number of the control which holds the Address string. This input is required to be able to disable or enable on the panel numeric control which holds instrument address based on selected interface type.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Enable/Disable is cluster input of two elements with enumeration type parameters to allow enable or disable corresponding control on the panel. This input is required to be able to disable or enable on the panel numeric control which holds instrument address based on selected interface type.

Outputs:

Address String is the output string which contains start character and two hexadecimal characters of the device address prefix for RS-485 interface option. If RS-232 interface is selected this string is empty.

VISA Refnum Out is the opened VISA session reference that needs to be used for all subsequent DPM/DPC VI which are using communication commands. Please note: only one sub-VI can execute at a given time referencing a given VISA session. If the VISA session wire is split to several sub-VI's for parallel execution, and error will occur. To operate multiple DPM/DPC commands to separate addresses in parallel, separate COM ports need to be used and initialized separately.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.1.2 Init Gas Combo

Init Gas Combo (SubVI).vi



Reads ASCII file and initializes array of strings with the names of the all gases supported by the instrument.

NOTE: Make sure the *GasTable.txt* file is located in the directory specified in the "name or relative path" input. This SubVI is required to implement "Select Gas" combo box and precision calculation for the floating point set point values used in different mass flow units of measure.

Inputs:

Name or relative path is string with the relative path to the file "GasTable.txt" which holds indexes and names for the all supported gases and gas mixtures.

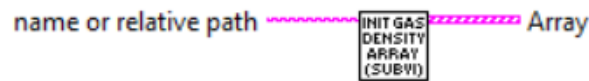
Outputs:

Array is array of strings to be wired to the *Select Gas* combo box *StringsAndValues[]* property.

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4.1.3 Init Gas Density Array

Init Gas Density Array (SubVI).vi



Reads ASCII file and initializes global Gas Density Array in Global.vi module.

NOTE: Make sure the GasDensity.txt file is located in the directory specified in the "name or relative path" input. This SubVI is required to implement precision calculation and maximum values verification for the set point values used in different mass flow units of measure.

Inputs:

Name or relative path is string with the relative path to the file "GasDensity.txt" which holds gas densities values for all supported gases and gas mixtures.

Outputs:

Array is array of clusters strings (Gas Name and Density value) to be wired to the corresponding VI function.

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4.1.4 Init Gas Ring Items

Init Gas Ring Items (SubVI).vi



Reads ASCII file and initializes array of strings with the names of the all gases supported by the instrument's User Define Gas Mixture feature.

NOTE: Make sure the GasTable1.txt file is located in the directory specified in the "name or relative path" input. This SubVI is required to implement "User Defined Gas Mixture" functionality (populate Ring boxes with the list of the gases supported by "User Defined Gas Mixture" feature).

Inputs:

Name or relative path is string with the relative path to the file "*GasTable1.txt*" which holds indexes and names for the all supported gases for the "User Defined Gas Mixture" feature.


Outputs:

Array is array of strings to be wired to the mixture Gas Ring box StringsAndValues[] property.

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4.1.5 Init Mass EU Array

Init Mass EU Array (SubVI).vi

name or relative path 

Reads ASCII file and initializes global Mass EU Array in Global.vi module.

NOTE: Make sure the *Mass Units.txt* file is located in the directory specified in the "*name or relative path*" input. This SubVI is required to implement "Select Mass Flow Units" feature and precision calculation for the set point values used in different mass flow units of measure. It also required for verification of maximum allowed set point value for particular mass EU.


Inputs:

Name or relative path is string with the relative path to the file "*Mass Units.txt*" which holds mass flow units of measure parameters.

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4.1.6 Init Pressure EU Array

Init Pressure EU Array (SubVI).vi

name or relative path 

Reads ASCII file and initializes global Pressure EU Array in Global.vi module.

NOTE: Make sure the *Pressure Units.txt* file is located in the directory specified in the "*name or relative path*" input. This SubVI is required to implement proper Chart Y-Axis scaling for Pressure variable.

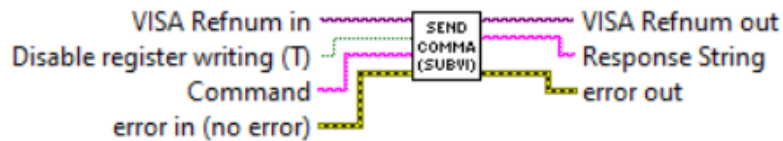
Inputs:

Name or relative path is string with the relative path to the file "*Pressure Units.txt*" which holds pressure units of measure parameters.

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4.1.7 Send Command

Send Command (SubVI).vi



Sends the specified MR or MW ASCII command to the instrument. Returns response as a string (unedited) which represent EEPROM register value.

WARNING: Use MW (EEPROM register write command) carefully, can cause unit to malfunction (Note: Some addresses are write protected).

The instrument EEPROM parameters were set on the factory to keep best performance. Do not change EEPROM parameters unless instructed by factory technical support representative.

Register writes can be disabled by wiring boolean TRUE constant to the "Disable register writing" terminal, and can be enabled by wiring a boolean FALSE constant to the "Disable register writing" terminal.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Disable register writing is boolean input which allows to Enable or Disable writing to the registers.

Command is string with *MR* or *MW* command and coma delimited EEPROM register index value. Allowable index values are from 0 to 413. For RS-485 interface '!' start character and two hexadecimal characters of address should precede the MR or MW command and arguments.

Outputs:

Response String is the exact string response from instrument, which represents register value.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

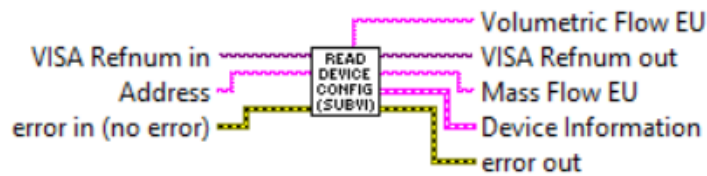
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4.2 Device Configuration

These sub-VI's are used for collecting instrument configuration parameters such as: device function, model number, serial number, selected gas, full scale range, currently selected mass and volumetric flow units, Totalizers status and analog output and input settings. It also provide information about presence of the Modbus interface hardware.

4.2.1 Read Device Configuration

Read Device Configuration (SubVI).vi



Reads key instrument configuration parameters and combines them in to the Device Configuration cluster. This sub-VI can be run at the beginning of a program outside the main loop, and should be re-run every time the instrument address is changed (for RS-485 interface).

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Volumetric Flow EU is the string with currently selected Volumetric Flow units of measure.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Mass Flow EU is the string with currently selected Mass Flow units of measure.

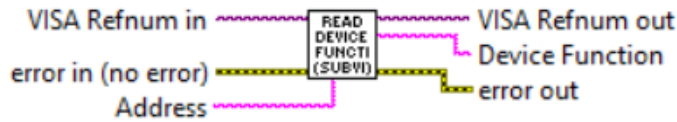
Device Information is cluster of strings containing the information regarding instrument's configuration parameters.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.2.2 Read Device Function

Read Device Function (SubVI).vi



Reads instrument function and returns numeric decimal string: 0 - if device is a Controller and 1 - if device is a Meter.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Device Function is the numeric string which represents following:

0 - device is a Controller (DPC);

1 - device is a Meter (DPM).

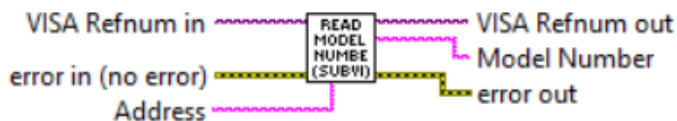
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.2.3 Read Model Number

Read Model Number (SubVI).vi



Reads instrument model number and returns string.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Model Number is the string with instrument's model number.

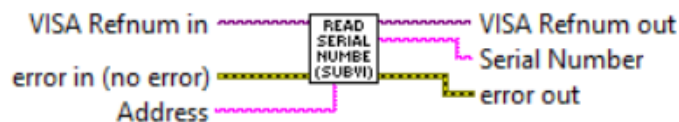
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.2.4 Read Serial Number

Read Serial Number (SubVI).vi



Reads instrument serial number and returns string.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Serial Number is the string with instrument's serial number.

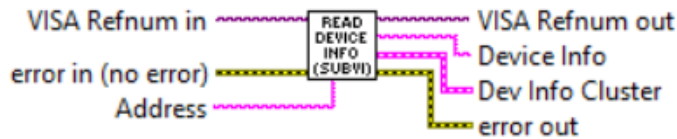
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.2.5 Read Device Info

Read Device Info (SubVI).vi



Reads instrument configuration parameters (using ASCII "DI" command) and parsing coma delimited output data frame in to the Device Information cluster.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Device Info is the string with coma delimited output data frame. Refer to DPM/DPC ASCII commands set (Table XXII in the DPC operating manual) for the list of the parameters returned by "DI" ASCII command.

Device Info Cluster is the cluster of strings parsed from "Device Info" string.

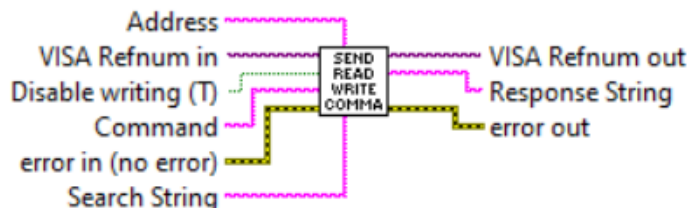
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.2.6 Send Read Write Command

Send Read Write Command (SubVI).vi



Reads and writes instrument's volatile memory (SRAM) registers.

WARNING: Write commands may be distractive. Use carefully, can cause device to malfunction! This SubVI only needed for instrument troubleshooting. If you need assistance please contact AALBORG at 845-770-3000 or info@aalborg.com

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Disable writing(T) will prevent any command that contains a "WRITE" string in the command frame, preventing registers from being written accidentally. Wiring a Boolean *FALSE* to this input will enable register write commands.

Command is the exact string READ or WRITE command with required arguments that will be sent out on the serial connection. Contact AALBORG at 845-770-3000 or info@aalborg.com for details about supported arguments values.

Search String specifies the string you want to search for and remove from the instrument's reply data frame. If *Search String* is an empty string then reply data frame will not be changed. It also can be used to validate *Response String* from the instrument.

Outputs:

Response String is the string with data frame containing the parameters requested based on the value of the argument submitted with the *Command* string.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

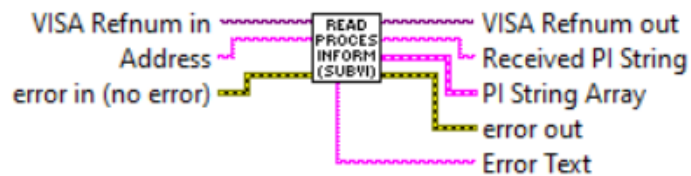
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4.3 Process Information

These sub-VI's are used for collecting instrument process information parameters such as: mass and volumetric flow rate, gas temperature and pressure, Totalizer#1 and Totalizer#2 readings, flow, pressure and temperature alarms status, alarm and diagnostic events registers values. For controllers it also includes current set point and proportional solenoid valve drive output values.

4.3.1 Read Process Information

Read Process Information (SubVI).vi



Reads Instrument Process Information [PI] data (using ASCII "PI" command) and parsing coma delimited output data frame in to the Process Information 1-D array of strings representing following parameters:

Mass Flow Rate (MEU)

Volumetric Flow Rate (VEU)

Totalizer#1 value (MEU)

Totalizer#2 value (MEU)

Gas Temperature (TEU)

Gas Pressure (PEU)

Flow Alarm Status [D,N,H,L]

Temp. Alarm Status [D,N,H,L]

Press. Alarm Status [D,N,H,L]

Current status of the Alarm Events Register (Hex, bitwise notation)

Current status of Diagnostic Events Register (Hex, bitwise notation)

NOTE: See list of the Alarm and Diagnostic Events in the instrument operating manual.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Received PI String is the string with coma delimited output data frame. Refer to DPM/DPC ASCII commands set (Table XXII in the DPC operating manual) for the list of the parameters returned by "PI" ASCII command.

PI String Array is the 1-D array of strings parsed from "Received PI String".

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

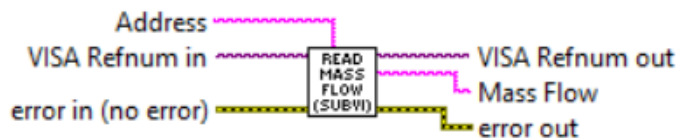
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

Error Text returns the Error text string if there are extra characters in the data frame output after the sub-VI has tried to parse all of the output variables. Please see Table XXII in the DPM/DPC operating manual for the description of the Error codes.

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4.3.2 Read Mass Flow

Read Mass Flow (SubVI).vi



Reads the instrument's *Mass flow* reading value (floating point string) in currently selected mass flow units of measure.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Mass Flow is the instrument's Mass flow reading value (floating point string) in currently selected mass flow units of measure.

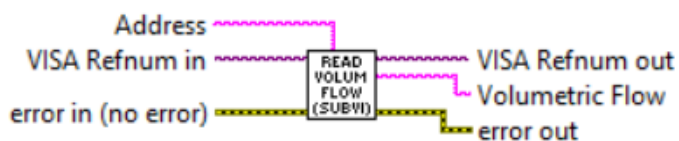
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.3.3 Read Volum Flow

Read Volum Flow (SubVI).vi



Reads the instrument's Volumetric flow reading value (floating point string) in currently selected volumetric flow units of measure.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Volumetric Flow is the instrument's *Volumetric* flow reading value (floating point string) in currently selected volumetric flow units of measure.

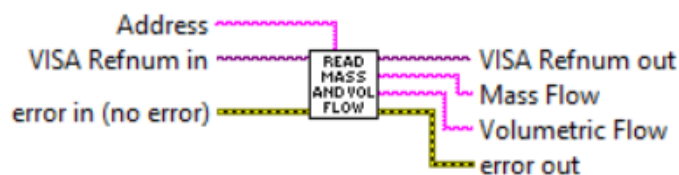
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.3.4 Read Mass and Volum Flow

Read Mass and Vol Flow (SubVI).vi



Reads the instrument's *Mass* and *Volumetric* flow reading values (floating point string) in currently selected mass and volumetric flow units of measure.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Volumetric Flow is the instrument's *Volumetric* flow reading value (floating point string) in currently selected volumetric flow units of measure.

Mass Flow is the instrument's *Mass* flow reading value (floating point string) in currently selected mass flow units of measure.

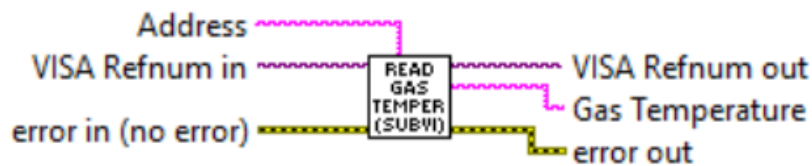
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.3.5 Read Gas Temperature

Read Gas Temperature (SubVI).vi



Reads the instrument's *Gas Temperature* reading value (floating point string) in currently selected temperature units of measure.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Gas Temperature is the instrument's *Gas Temperature* reading value (floating point string) in currently selected temperature flow units of measure.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.3.6 Read Gas Pressure

Read Gas Pressure (SubVI).vi



Reads the instrument's *Gas Pressure* reading value (floating point string) in currently selected pressure units of measure.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Gas Pressure is the instrument's *Gas Pressure* reading value (floating point string) in currently selected pressure flow units of measure.

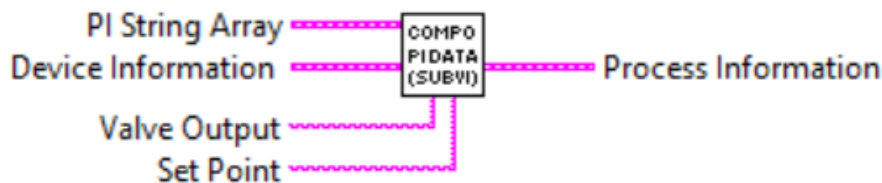
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.3.7 Compose PI Data

Compose PI Data (SubVI).vi



Combines data from different sources (PI Array, Device Information cluster, Valve Output string, Set Point string) in to the Process Information cluster.

Inputs:

PI String Array is the 1-D array of strings with instrument's current Process Information parameters.

Device Information is cluster of strings containing the information regarding instrument's configuration parameters.

Valve Output is the instrument's *Valve Drive* reading (coma delimited decimal and floating point strings) expressed in counts and percent of full scale (fractional notation).

Set Point is the instrument's current *Set Point* value (floating point string) in currently selected mass flow units of measure.

Outputs:

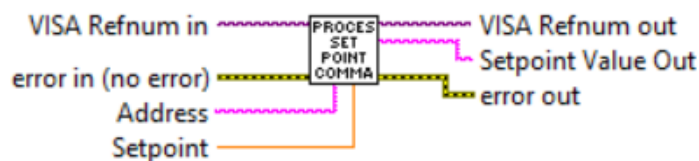
Process Information is a cluster with combination of instrument's configuration and process information parameters.

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4.4 Set Point

4.4.1 Process Set Point Command

Process Set Point Command (SubVI).vi



Reads/writes set point value from/to the instrument. To read current set point value wire to the "Setpoint" terminal -1.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Setpoint is a required input and reflects the set point value (double) in the currently selected mass flow units that will be written to the device. In order to read current set point value wire to the "Setpoint" terminal -1 (instrument will reply floating point string with current set point value).

Outputs:

Setpoint Value Out is the instrument's current set point value (floating point string) in currently selected mass flow units of measure.

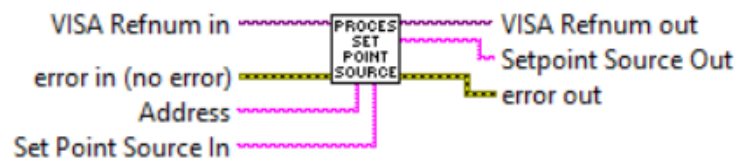
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.4.2 Process Set Point Source Command

Process Set Point Source Command (SubVI).vi



Reads/writes set point source from/to the instrument. To read current set point source leave "*Setpoint Source In*" terminal open. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for "*Setpoint Source In*" input terminals.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Set Point Source In is the (string with one ASCII character) specifying the set point input source that you would like for the DPC instrument to change to. Following set point sources are available:

"D" - Digital Interface

"A" - Analog Interface

"L" - Local OLED/Joystick Interface

"P" - Program Set Point

To read current "*Set Point Source*" settings do not wire anything to "*Set Point Source In*" terminal.

Outputs:

Setpoint Source Out is the instrument's current set point source (ASCII string) settings.

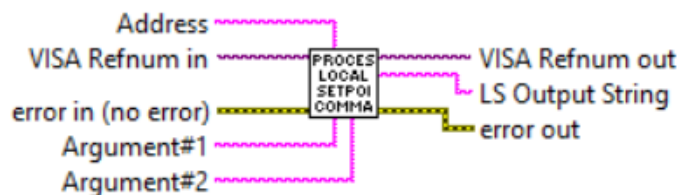
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.4.3 Process Local Setpoint Command

Process Local Setpoint Command (SubVI).vi



Reads/writes instrument's Local Setpoint parameters (Saved Local Set point value, Local & Digital SP Merge mode, Local Set point Auto Start mode). Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for Argument#1 and Argument#2 input terminals.

WARNING: The "*Saved Local Setpoint*" parameter is saved in the instrument's EEPROM memory. To prevent EEPROM burning, avoid writing "*Saved Local Setpoint*" parameters more often than one time per minute.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is the (string with one ASCII character) specifying the local set point parameter that you would like for the DPC instrument to change to.

Argument#2 is the (string) specifying the value for particular local set point parameter that you would like for the DPC instrument to change to.

Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for *Argument#1* and *Argument#2* input terminals.

Outputs:

LS Output String is the reply string with requested instrument's local set point settings.

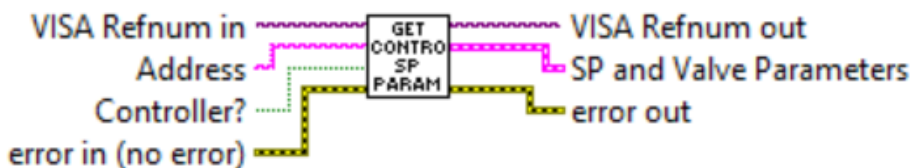
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.4.4 Get Controller SP Parameters

Get Controller SP Parameters (SubVI).vi



Reads instrument set point source (Digital, Analog, Local, PSP) and value in currently selected mass flow units of measure and queries the instrument valve mode (Closed, Auto, Opened). Combines received data frames in to the "SP and Valve Parameters" cluster.

NOTE: these functions only performed when boolean TRUE is wired to the "Controller?" terminal.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Controller? is the boolean input. Wiring a boolean *TRUE* to this input will enable instrument query.

Outputs:

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

SP and Valve Parameters is a cluster with instrument's response which includes following parameters:

Set Point Source Out - is the string (with one ASCII character) specifying the set point input source (D,A,L,P);

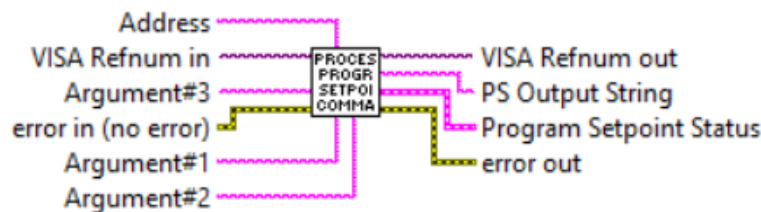
Valve Mode Out - is the string (with one ASCII character) specifying the solenoid valve operational mode (C,A,O);

Set Point - is the instrument's current set point value (double) in currently selected mass flow units of measure.

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4.4.5 Process Program Setpoint Command

Process Program Setpoint Command (SubVI).vi



Reads/writes PSP control parameters (Mode, Loop status, Run/Stop status, Step Mask). Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values of the Argument#1, Argument#2 and Argument#3 input terminals.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is the (string with one ASCII character) specifying the PSP parameter that you would like for the DPC instrument to change to.

Argument#2 is the (string) specifying the value for particular PSP parameter that you would like for the DPC instrument to change to.

Argument#3 is the (string) specifying the value for particular PSP parameter that you would like for the DPC instrument to change to.

Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for *Argument#1*, *Argument#2* and *Argument#3* terminals.

Outputs:

PS Output String is the string with coma delimited output data frame. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) for the list of the parameters returned by "PS" ASCII command.

Program Setpoint Status is a cluster with instrument's response which includes following parameters:

PSP Running? is (boolean *TRUE* or *FALSE*) value representing current status of the PS program: *TRUE* - PSP is running, *FALSE* - PSP is not running;

Current PSP Step is (unsigned long 32 bit integer) value representing the PSP active step number [1-16].

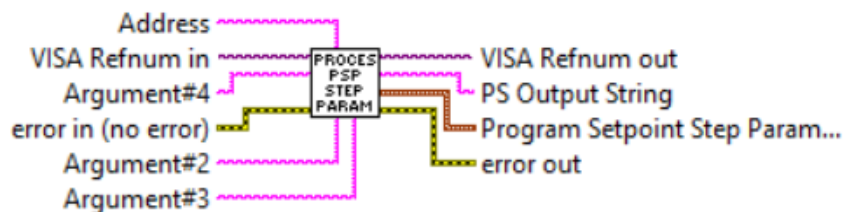
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.4.6 Process PSP Step Parameters

Process PSP Step Parameters (SubVI).vi



Reads/writes PSP step parameters for selected PSP step. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values of the Argument#2, Argument#3 and Argument#4 input terminals. The reply data from the instrument are populated in to the "Program Setpoint Step Parameters" cluster.

WARNING: The PSP parameter are saved in the instrument's EEPROM memory. To prevent EEPROM burning avoid calling program more often than one time per one minute.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls. would like for the DPC instrument to change to.

Argument#2 is the (string with one ASCII character) specifying the PSP parameter that you would like for the DPC instrument to change to.

Argument#3 is the (string) specifying the value for particular PSP parameter that you would like for the DPC instrument to change to.

Argument#4 is the (string) specifying the value for particular PSP parameter that you would like for the DPC instrument to change to.

NOTE: Argument#1 is submitted internally by sub-VI. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for *Argument#2*, *Argument#3* and *Argument#4* terminals.

Outputs:

PS Output String is the string with coma delimited output data frame. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) for the list of the parameters returned by "PS" ASCII command.

Program Setpoint Step Parameters is a cluster with instrument's response which includes following parameters:

Step# is (unsigned long 32 bit integer) value representing the PSP step number [1-16];

Step SP Value is step set point value (double) expressed in the % of full scale units of measure;

Time to Approach is (unsigned long 32 bit integer) value representing the PSP step time interval in seconds (0 to 86400).

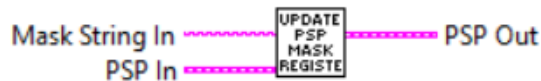
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.4.7 Update PSP Mask Register

Update PSP Mask Register (SubVI).vi



Updates Program Setpoint Mask check box array of the PSP cluster base on Program Setpoint Mask register (hex string) value.

Inputs:

Mask String In is hexadecimal string (16 bit wide) representing status for all 16 program set point steps: 1 - Enabled, 0 - Disabled. Allowable range from 0x000 to 0xFFFF. NOTE: all 6 characters are required.

PSP In is the cluster with PSP parameter representing *Set Point* value (double) in %FS units of measure, *Time* (unsigned long 32 bit integer) value representing the PSP step time interval in seconds (0 to 86400) and boolean step status (Enable or Disable) for all 16 steps.

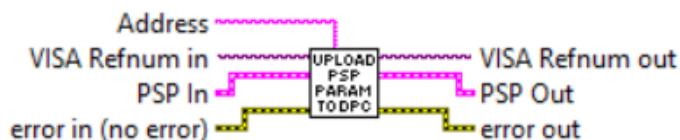
Outputs:

PSP Out is the cluster with PSP parameter representing *Set Point* value (double) in %FS units of measure, *Time* (unsigned long 32 bit integer) value representing the PSP step time interval in seconds (0 to 86400) and boolean step status (Enable or Disable) updated for all 16 steps based on input value of the *Mask String In* parameter.

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4.4.8 Upload PSP Parameters to DPC

Upload PSP Parameters to DPC (SubVI).vi



This SubVI is using "Process PSP Step Parameters (SubVI)" to upload all 16 steps of the PSP data from PSP In cluster in to the instrument's EEPROM memory.

WARNING: The PSP parameter are saved in the instrument's EEPROM memory. To prevent EEPROM burning avoid calling program more often than one time per one minute.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

PSP In is the cluster with PSP parameter representing Set Point value (double) in %FS units of measure, Time (unsigned long 32 bit integer) value representing the PSP step time interval in seconds (0 to 86400) and boolean step status (Enable or Disable) for all 16 steps to be uploaded to the DPC.

Outputs:

PSP Out is the cluster with PSP parameter representing Set Point value (double) in % FS units of measure, Time (unsigned long 32 bit integer) value representing the PSP step time interval in seconds (0 to 86400) and boolean step status (Enable or Disable) updated for all 16 steps based on input values in the *PSP In* cluster.

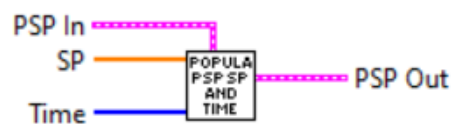
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.4.9 Populate PSP SP and Time

Populate PSP SP and Time (SubVI).vi



Populates PSP cluster with set point and time data for all 16 steps based on values of the SP and Time arrays.

Inputs:

PSP In is a cluster with PSP parameter representing Set Point value (double) in %FS units of measure, Time (unsigned long 32 bit integer) value representing the PSP step time interval in seconds (0 to 86400) and boolean step status (Enable or Disable) for all 16 steps to be updated with new values.

SP is array of set point values (double) expressed in % of full scale units of measure representing set points for all 16 steps of the PSP program.

Time is array of time interval values (unsigned long 32 bit integer) representing the PSP step time interval in seconds (0 to 86400) for all 16 steps of the PSP program.

Outputs:

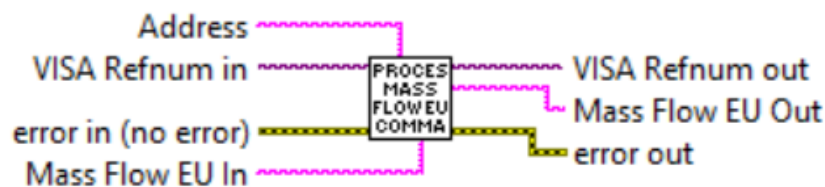
PSP Out is a cluster with updated PSP parameters.

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4.5 Engineering Units

4.5.1 Process Mass Flow EU Command

Process Mass Flow EU Command (SubVI).vi



Reads currently selected mass flow EU from instrument (when nothing is wired to the "Mass Flow EU In" terminal or writes new mass flow EU to the instrument according to the string wired to the "Mass Flow EU In" terminal.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Mass Flow EU In is a string that contains the mass flow units of measure.

To read current mass flow units of measure settings do not wire anything to "Mass Flow EU In" terminal.

Outputs:

Mass Flow EU Out is a string that contains instrument's currently selected mass flow units of measure.

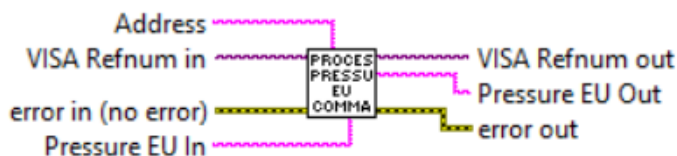
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.5.2 Process Pressure EU Command

Process Pressure EU Command (SubVI).vi



Reads currently selected Pressure EU from instrument (when nothing is wired to the "Pressure EU In" terminal or writes new Pressure EU to the instrument according to the string wired to the "Pressure EU In" terminal.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Pressure EU In is a string that contains the pressure units of measure that you would like for the instrument to change to.

To read current pressure units of measure settings do not wire anything to "Pressure EU In" terminal.

Outputs:

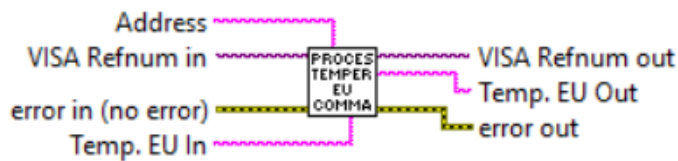
Pressure EU Out is a string that contains instrument's currently selected pressure units of measure.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.5.3 Process Temperature EU Command

Process Temperature EU Command (SubVI).vi



Reads currently selected Temperature EU from instrument (when nothing is wired to the "Temp. EU In" terminal or writes new Temperature EU to the instrument according to the string wired to the "Temp. EU In" terminal.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Temp. EU In is a string that contains the temperature units of measure that you would like for the instrument to change to.

To read current temperature units of measure settings do not wire anything to "Temp. EU In" terminal.

Outputs:

Temp. EU Out is a string that contains instrument's currently selected temperature units of measure.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.5.4 Process Vol Flow EU Command

Process Vol Flow EU Command (SubVI).vi



Reads currently selected volumetric flow EU from instrument (when nothing is wired to the "Vol Flow EU In" terminal or writes new volumetric flow EU to the instrument according to the string wired to the "Vol Flow EU In" terminal.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Vol Flow EU In is a string that contains the volumetric flow units of measure.

To read current volumetric flow units of measure settings do not wire anything to "Vol Flow EU In" terminal.

Outputs:

Vol Flow EU Out is a string that contains instrument's currently selected volumetric flow units of measure.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.5.5 Read Pressure EU

Read Pressure EU (SubVI).vi



Reads currently selected Pressure EU from instrument.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Pressure EU is a string that contains instrument's currently selected pressure units of measure.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.5.6 Read Temperature EU

Read Temperature EU (SubVI).vi



Reads currently selected Temperature EU from instrument.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Temperature EU is a string that contains instrument's currently selected temperature units of measure.

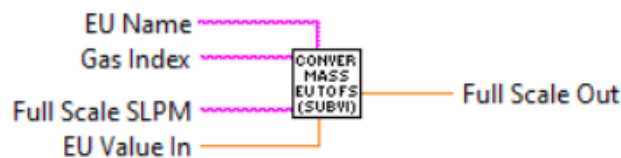
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.5.7 Convert Mass EU to FS

Convert Mass EU to FS (SubVI).vi



Converts Mass Flow value (wired to the "EU Value In" terminal) in selected mass flow EU (wired to the "EU Name" terminal) to %FS value. This sub-VI is used to validate set point value from the user input.

NOTE: Maximum allowed set point value for DPC instrument is 125% of full scale.
Inputs:

EU Name is string with mass flow units of measure name which has to be converted to value expressed in percent of full scale units of measure (required input).

Gas Index is the numerical string with index of the currently selected gas (required input). Valid values are from 0 to 128.

Full Scale SLPM is a floating point string with instrument's full scale range value expressed in sl/min units of measure (required input). Instrument full scale range parameter can be obtained with "Read Device Info" sub-VI.

EU Value In is the value (double) of the mass flow expressed in the "EU Name" mass flow units of measure to be converted to value expressed in percent of full scale units of measure (required input).

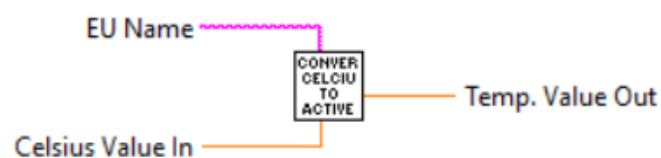
Outputs:

Full Scale Out is mass flow value (double) expressed in the percent of full (%FS) scale units of measure.

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4.5.8 Convert Celsius to Active EU

Convert Celsius to Active Temp EU (SubVI).vi



Converts temperature in Celsius to the temperature value in temperature unit of measure which is wired to the "EU Name" terminal.

Inputs:

EU Name is one character string which represents temperature units of measure to which you want to convert temperature value in Celsius (C,K, F, R).

Celsius Value In is temperature value (double) expressed in Celsius to be converted to temperature units of measure wired to the "EU Name" terminal.

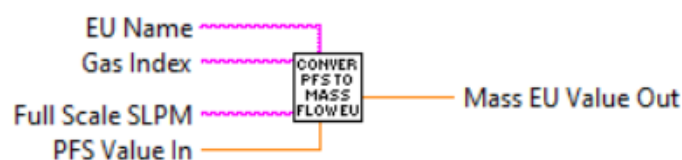
Outputs:

Temp. Value Out is temperature value (double) expressed in temperature unit of measure which is wired to the "EU Name" terminal.

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4.5.9 Convert PFS to Mass Flow EU

Convert PFS to Mass Flow EU (SubVI).vi



Converts mass flow expressed in PFS @ Factory STD conditions ([0.0-100.0%] notation) wired to the "PFS Value In" terminal to the engineering units (STP/NTP conditions) which are wired to the "EU Name" terminal. This VI has to be run in the beginning of the instrument initialization and each time the instrument selected gas or mass flow EU are changed.

Inputs:

EU Name is string with mass flow units of measure name which represents mass flow units of measure to which you want to convert "PFS Value In" (required input).

Gas Index is the numerical string with index of the currently selected gas (required input). Valid values are from 0 to 128.

Full Scale SLPM is a floating point string with instrument's full scale range value expressed in sl/min units of measure (required input). Instrument full scale range parameter can be obtained with "Read Device Info" sub-VI.

PFS Value In is the value (double) expressed in the percent of full scale (%FS) mass flow units of measure to be converted to value expressed in the mass flow units of measure wired to the "EU Name" terminal (required input).

Outputs:

Mass EU Value Out is mass flow value (double) converted to value expressed in the mass flow units of measure wired to the "EU Name" terminal.

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4.5.10 Convert Mass Flow EU to Totalizer EU

Convert Mass Flow EU to Totalizer EU (SubVI).vi



Converts time based mass flow units of measure name to the corresponding volumetric/mass (not time based) units of measure name used in Totalizer reading.

Inputs:

Mass Flow EU is a string which represents mass flow units of measure name (time based).

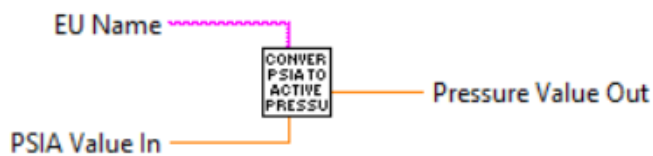
Outputs:

Totalizer EU is a string which represents volumetric/mass (not time based) units of measure name.

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4.5.11 Convert PSIA to Active Pressure EU

Convert PSIA to Active Pressure EU (SubVI).vi



Converts pressure in PSIA units of measure to the pressure value in pressure unit of measure which is wired to the "EU Name" terminal.

Inputs:

EU Name is a string which represents pressure units of measure name to which you want to convert pressure value in PSIA.

PSIA Value In is a pressure value (double) expressed in PSIA to be converted to pressure units of measure wired to the "EU Name" terminal.

Outputs:

Pressure Value Out is a pressure value (double) expressed in pressure unit of measure which is wired to the "EU Name" terminal.

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4.6 Gas Selection

4.6.1 Process Gas Select Command

Process Gas Select Command (SubVI).vi



Reads currently selected Gas name from the instrument (if "Gas Select In" terminal is not wired). Writes specified Gas number to the instrument ("Gas Select In" terminal need to be wired with desired gas index decimal string).

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Gas Select In is a decimal string that contains the index of the Gas that you would like for the instrument to change to (supported gas indexes: 0-128).

To read current *Gas Select* settings do not wire anything to "Gas Select In" terminal.

Outputs:

Gas Select Out is a string that contains two coma delimited parameters:

- instrument's currently selected gas index (0-128);
- instrument's currently selected gas name.

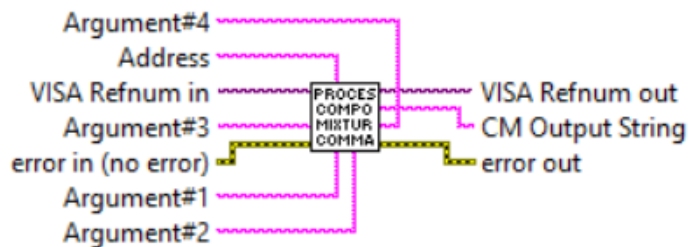
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.6.2 Process Compose Mixture Command

Process Compose Mixture Command (SubVI).vi



Writes a new User Defined gas mixture with the specified gas ratios, gas mixture name (up to 6 characters), and gas mixture number (200-219).

This Sub-VI also can be used to update or delete a currently selected User Defined gas mixture in real time.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is a decimal string with new Gas Mixture index [200 - 219].

Argument#2 is a string with ';' delimited gas components indexes [0-30] for new Gas Mixture.

Argument#3 is a floating point string with ';' delimited gas components ratios for new Gas Mixture (number of components should be the same as in *Argument#2*).

Argument#4 is a string with new Gas Mixture name (up to 6 characters).

Outputs:

CM Output String is string output that relates any errors encountered in the Gas Mixture creation procedure back to the user. In case of success it contains three coma delimited parameters:

- new Gas Mixture index [200-219];
- new Gas Mixture name (up to 6 characters);
- number of Gas components in the new Gas Mixture [2-5].

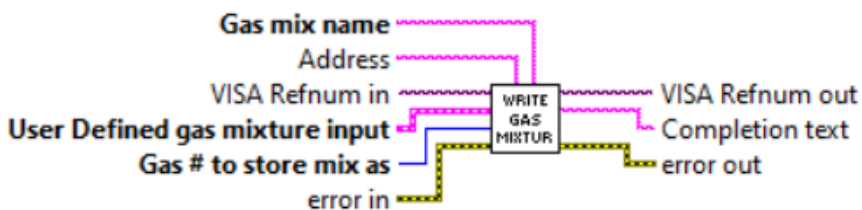
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.6.3 Write Gas Mixture

Write Gas Mixture.vi



Writes a new gas mixture with the specified gas ratios, gas mixture name (up to 6 characters), and gas mixture number (200-219). New Gas mixture will be created only if sum of ratios for all components is equal to 100%.

This SubVI can be also used to update a currently selected gas mixture with new parameters in real time.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Gas mix name is a string with new Gas Mixture name (up to 6 characters).

Gas # to store mix as is a decimal string with new Gas Mixture index [200 - 219].

User Define gas mixture input is a required input that specifies the gas numbers and mixture percentages of the User Define gas mixture that is being created. These percentages must add up to 100%, and the gas numbers are required to be gases that the instrument has in its internal gas table.

Outputs:

Completion text is string output that relates any errors encountered in the Gas Mixture creation procedure back to the user. In case of success it contains three coma delimited parameters:

- new Gas Mixture index [200-219];
- new Gas Mixture name (up to 6 characters);
- number of Gas components in the new Gas Mixture [2-5].

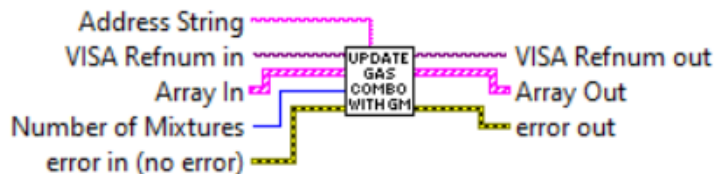
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.6.4 Update Gas Combo with GM

Update Gas Combo with GM (SubVI).vi



Reads existing user defined gas mixtures from the DPM/DPC instrument and populate them in to the "Gas Select" array of the supported gases to be wired to the "Gas Select" combo box control. Before calling this Sub-VI use "Process Compose Mixture Command (SubVI)" with no arguments to determine number of the existing user defined gas mixtures saved in the instrument's memory.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address string is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Array In is a 1D Array of clusters of two strings which contains Gas names and Gas indexes for each Gas (not includes the Gas Mixtures) saved in the instrument's memory.

Number of Mixtures is an unsigned integer which represent number of the existing user defined gas mixtures saved in the instrument's memory.

Outputs:

Array Out is a 1D Array of clusters of two strings updated with Gas Mixtures which contains Gas names and Gas indexes for each Gas saved in the instrument's memory.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

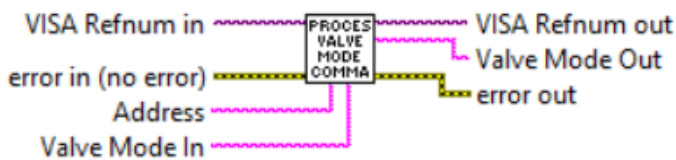
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.7 Valve Control

4.7.1 Process Valve Mode Command

Process Valve Mode Command (SubVI).vi



Reads/writes instrument's valve operational mode. Leave "*Valve Mode In*" input terminal open to read current status.

WARNING: Before activating Valve Open mode make sure the differential pressure across instrument does not exceed maximum allowed differential pressure for corresponding DPM/DPC model (12 PSID for regular instruments and 9.75 PSID for low differential pressure BREEZE models).

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Valve Mode In is the string with one ASCII character specifying the *Valve Mode* that you would like for the DPC instrument to change to. Following valve modes are available:

C - Close Valve

A - Auto (normal operational mode to control setpoint).

O - Open Valve

Outputs:

Valve Mode Out is a string with one ASCII character representing current *Valve Mode* settings.

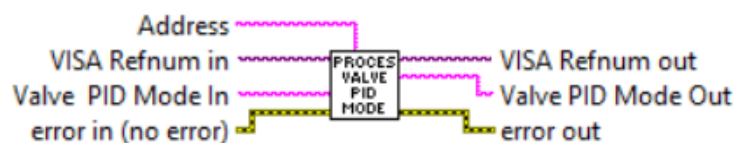
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.7.2 Process Valve PID Mode Command

Process Valve PID Mode Command (SubVI).vi



Reads/writes instrument's PID operational mode. Leave "Valve PID Mode In" input terminal open to read current status.

WARNING: DPC instrument Valve PID parameters were adjusted on the factory according to your order and they designed to handle most applications. Do not change PID parameters unless instructed by factory technical support representative! It is recommended to contact factory technical support if DPC instrument exhibit any problem or different PID parameters are required for your application.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Valve PID Mode In is the decimal string specifying the *Valve PID Mode* that you would like for the DPC instrument to change to. Following valve PID modes are available:

- 0 - PD algorithm (factory default);
- 1 - PID algorithm;
- 2 - PIDD algorithm.

Outputs:

Valve PID Mode Out is a decimal string representing current *Valve PID Mode* settings.

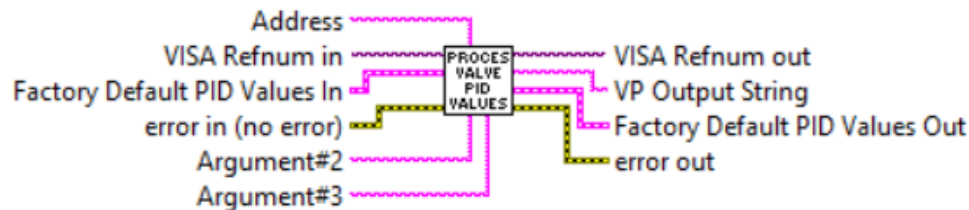
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.7.3 Process Valve PID Values Command

Process Valve PID Values Command (SubVI).vi



Reads/writes instrument's PID parameters (Proportional, Integral, Derivative gains, Valve Bias and KmP coefficient values). Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for *Argument#2* and *Argument#3* input terminals.

WARNING: DPC instrument Valve PID parameters were adjusted on the factory according to your order and they designed to handle most applications. Do not change PID parameters unless instructed by factory technical support representative! It is recommended to contact factory technical support if DPC instrument exhibit any problem or different PID parameters are required for your application.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#2 is a one ASCII character string representing PID parameter that you would like for the DPC instrument to change to. Following valve PID parameters are available:

P - Proportional;

I - Integral;

D - Derivative;

B - Valve Bias Current expressed in percent of full scale (fractional notation [0.0 - 1.0]);

M - Valve KmP Coefficient.

Argument#3 is a floating point string representing value of the PID parameter (specified in the *Argument#2* input) that you would like for the DPC instrument to change to. Leave *Argument#3* input open to read current value of the parameter wired to the *Argument#2* input.

Factory Default PID Values In is a cluster of floating point strings with all five valve PID parameters values.

Outputs:

VP Output String is a floating point string which represents current value of the requested (wired to *Argument#2*) PID parameter.

Factory Default PID Values Out is a cluster of floating point strings with updated valve PID parameters values.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

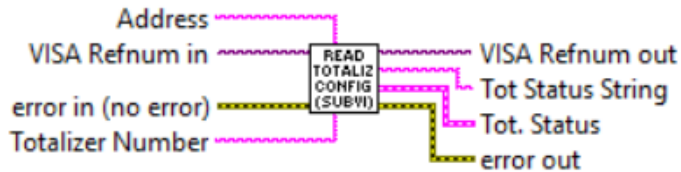
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8 Totalizer and Pulse Output

4.8.1 Read Totalizer Configuration

Read Totalizer Configuration (SubVI).vi



Queries instrument's Totalizer parameters, parses data frame received from the instrument and populates data in to the *Tot. Status* cluster. Wire decimal string with 1 or 2 value to "Totalizer Number" input terminal to select desired Totalizer.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Totalizer Number is a decimal string with *Totalizer* number you want to read parameters from (1 or 2).

Outputs:

Tot Status String is the string with coma delimited output data frame. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) for the list of the parameters returned by "T,n,S" ASCII command.

Tot. Status is a cluster of 6 strings with instrument's response which represents current Totalizer parameters.

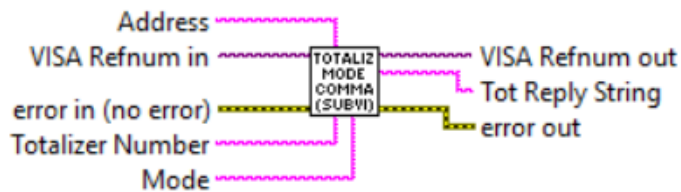
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8.2 Totalizer Mode Command

Totalizer Mode Command (SubVI).vi



Reads/writes Totalizer "Mode" parameter for selected Totalizer. Wire decimal string with 1 or 2 value to "Totalizer Number" input terminal to select desired Totalizer. Leave "Mode" input terminal open to read current Totalizer "Mode" parameter settings.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Totalizer Number is a decimal string with Totalizer number you want to read from or write to "Mode" parameter value (1 or 2).

Mode is a one character string specifying the Totalizer "Mode" value that you would like for the instrument to change to. Wire to "Mode" input terminal following string:
D - to Disable Totalizer.
E - to Enable Totalizer.

Outputs:

Tot Reply String is the one ASCII character string with instrument's current Totalizer "Mode" value.

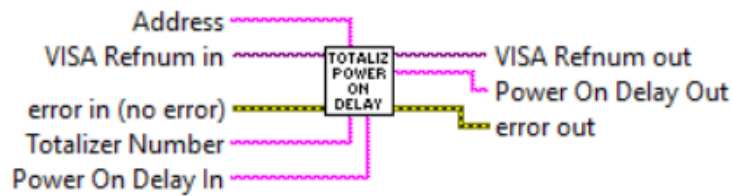
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8.3 Totalizer Power On Delay

Totalizer Power On Delay (SubVI).vi



Reads/writes Totalizer "Power On Delay" parameter for selected Totalizer. Wire decimal string with 1 or 2 value to "Totalizer Number" input terminal to select desired Totalizer. Leave "Power On Delay In" input terminal open to read current settings. Wire to "Power On Delay In" input terminal decimal string to set desired value (allowable range from 0 to 3600 seconds).

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Totalizer Number is a decimal string with Totalizer number you want to read from or write to "Power On Delay" parameter value (1 or 2).

Power On Delay In is a decimal string specifying the Totalizer "Power On Delay" value that you would like for the instrument to change to (allowable range from 0 to 3600 seconds).

Outputs:

Power On Delay Out is decimal string with instrument's current Totalizer "Power On Delay" parameter value.

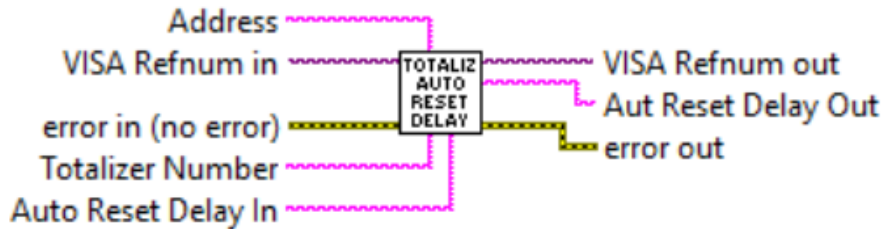
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8.4 Totalizer Auto Reset Delay

Totalizer Auto Reset Delay (SubVI).vi



Reads/writes Totalizer "Auto Reset Delay" parameter for selected Totalizer. Wire decimal string with 1 or 2 value to "Totalizer Number" input terminal to select desired Totalizer. Leave "Auto Reset Delay In" input terminal open to read current settings. Wire to "Auto Reset Delay In" input terminal decimal string to set desired value (allowable range from 0 to 3600 seconds).

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Totalizer Number is a decimal string with Totalizer number you want to read from or write to "Power On Delay" parameter value (1 or 2).

Auto Reset Delay In is a decimal string specifying the Totalizer "Auto Reset Delay" value that you would like for the instrument to change to (allowable range from 0 to 3600 seconds).

Outputs:

Auto Reset Delay Out is decimal string with instrument's current Totalizer "Auto Reset Delay" parameter value.

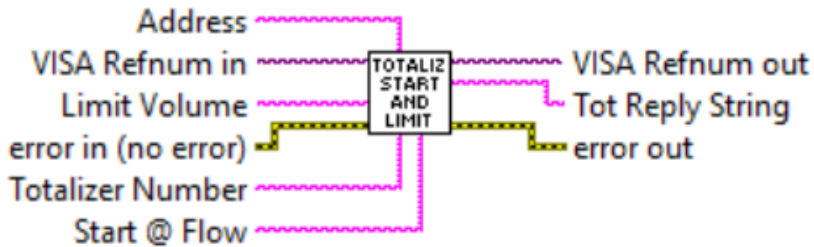
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8.5 Totalizer Start And Limit Command

Totalizer Start And Limit Command (SubVI).vi



Reads/writes Totalizer "*Start @ Flow*" and "*Limit Volume*" parameters for selected Totalizer. Wire decimal string with 1 or 2 value to "*Totalizer Number*" input terminal to select desired Totalizer. Leave "*Start @ Flow*" and "*Limit Volume*" input terminals open to read current settings (coma delimited floating point string). Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for "*Start @ Flow*" and "*Limit Volume*" input terminals.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Totalizer Number is a decimal string with Totalizer number you want to read from or write to "*Power On Delay*" parameter value (1 or 2).

Start @ Flow is a floating point string specifying the Totalizer "*Start @ Flow*" value that you would like for the instrument to change to (in percent full scale units of measure).

Limit Volume is a floating point string specifying the Totalizer "*Action Volume*" value that you would like for the instrument to change to (in currently selected volume/mass units of measure).

Outputs:

Tot Reply String is a floating point string with coma delimited "*Start @ Flow*" and "*Action Volume*" parameters values.

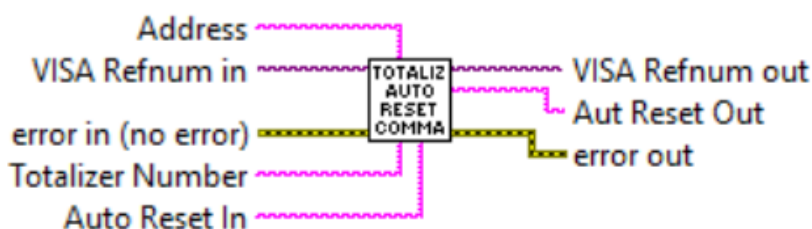
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8.6 Totalizer Auto Reset Command

Totalizer Auto Reset Command (SubVI).vi



Reads/writes Totalizer "Auto Reset" parameter for selected Totalizer. Wire decimal string with 1 or 2 value to "Totalizer Number" input terminal to select desired Totalizer. Leave "Auto Reset In" input terminal open to read current settings. Wire to "Auto Reset In" input terminal decimal string to set desired value (0-Disable; 1 - Enable).

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Totalizer Number is a decimal string with Totalizer number you want to read from or write to "Power On Delay" parameter value (1 or 2).

Auto Reset In is a decimal string specifying the Totalizer "Auto Reset" parameter value that you would like for the instrument to change to. Wire to *Auto Reset In* terminal following decimal string:

0 - to Disable Totalizer Auto Reset feature;

1 - to Enable Totalizer Auto Reset feature.

Outputs:

Auto Reset Out is decimal string with instrument's current Totalizer "Auto Reset" parameter value [0 or 1].

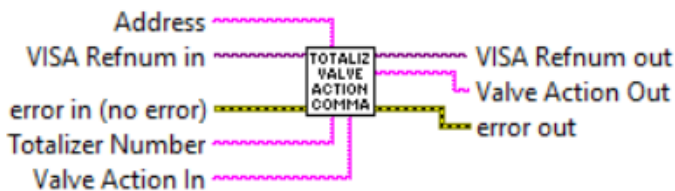
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8.7 Totalizer Valve Action Command

Totalizer Valve Action Command (SubVI).vi



Reads/writes Totalizer "Valve Over Limit Action" parameter for selected Totalizer. Wire decimal string with 1 or 2 value to "Totalizer Number" input terminal to select desired Totalizer. Leave "Valve Action In" input terminal open to read status. Wire to "Valve Action In" input terminal decimal string to set desired value (0-Disable; 1 - Enable).

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Totalizer Number is a decimal string with Totalizer number you want to read from or write to "Power On Delay" parameter value (1 or 2).

Valve Action In is a decimal string specifying the Totalizer "Valve Action" parameter value that you would like for the instrument to change to. Wire to *Valve Action In* terminal following decimal string:

0 - to Disable *Valve Close Over Limit* feature;

1 - to Enable *Valve Close Over Limit* feature.

Outputs:

Valve Action Out is decimal string with instrument's current Totalizer "Valve Action" parameter value [0 or 1].

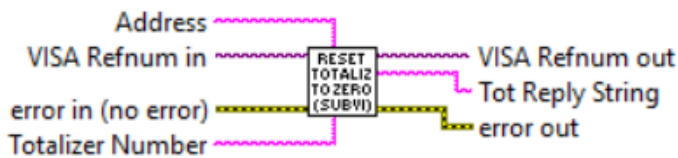
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8.8 Reset Totalizer to Zero

Reset Totalizer to Zero (SubVI).vi



Performs a reset of the Totalizer reading. Wire decimal string with 1 or 2 value to "Totalizer Number" input terminal to select desired Totalizer.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Totalizer Number is a decimal string with Totalizer number you want to read from or write to "Power On Delay" parameter value (1 or 2).

Outputs:

Tot Reply String is a string output that relates a status of the Totalizer reset action.

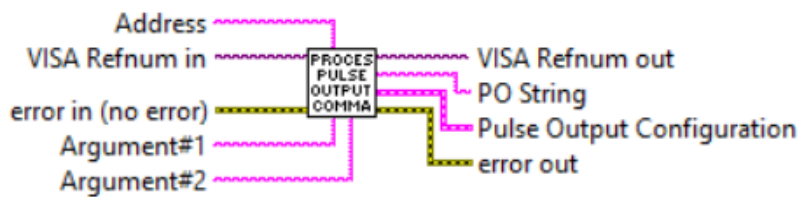
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8.9 Process Pulse Output Command

Process Pulse Output Command (SubVI).vi



Reads/writes instrument's Pulse Output parameters (*PO Mode, Start @ Flow, Unit per Pulse, Pulse Active Time*). Refer to DPM/DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for *Argument#1* and *Argument#2* input terminals.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is the (string with one ASCII character) specifying the *Pulse Output* parameter that you would like for the instrument to read or to change to.

Argument#2 is the (string) specifying the value for particular *Pulse Output* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the *Argument#1*.

Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for *Argument#1* and *Argument#2* terminals.

Outputs:

PO String is a string output that contains the value of the parameter wired to the *Argument#1* input terminal.

Pulse Output Configuration is a cluster of 4 strings which represents PO parameters.

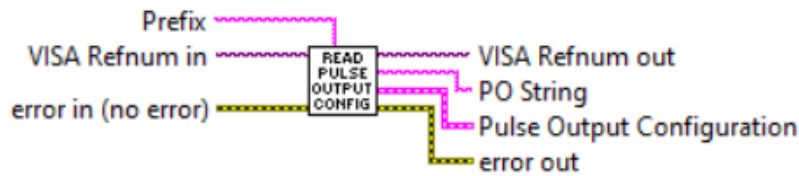
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.8.10 Read Pulse Output Configuration

Read Pulse Output Configuration (SubVI).vi



Queries instrument's Pulse Output parameters (*PO Mode, Start @ Flow, Unit per Pulse, Pulse Active Time*), parses data frame received from the instrument and populates data in to the Pulse Output Configuration cluster.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

PO String is a string with coma delimited output data frame representing Pulse Output settings.

Pulse Output Configuration is a cluster of 4 strings which represents PO parameters. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) for details.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

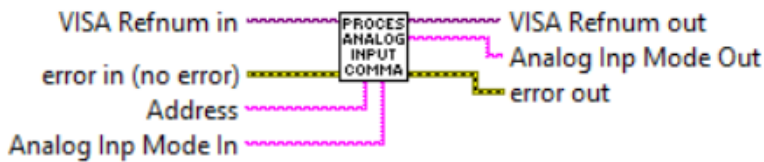
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.9 Analog and SSR

4.9.1 Process Analog Input Command

Process Analog Input Command (SubVI).vi



Reads/writes instrument's Analog Input interface type parameter.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Set Analog Inp Mode In is a decimal string specifying the analog input type that you would like for the DPC instrument to change to. Following *Analog Input* modes are available:

"0" - 0-5 Vdc

"1" - 0-10 Vdc

"2" - 4-20 mA

To read current "Analog Input Mode" settings do not wire anything to "Analog Inp Mode In" terminal.

Outputs:

Analog Inp Mode Out is the reply string with requested instrument's *Analog Input Mode* settings.

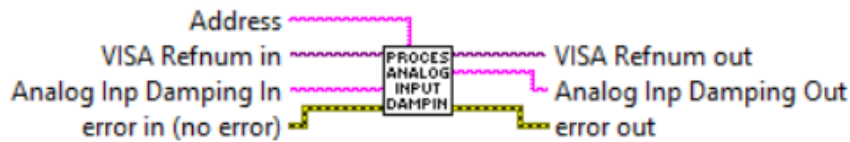
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.9.2 Process Analog Input Damping

Process Analog Input Damping (SubVI).vi



Reads/writes *Analog Input* running average filter parameter. Valid decimal string values for "*Analog Input Damping*" are in the range 0 to 100 samples.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Analog Inp Damping In is a decimal string specifying the running average filter "*Analog Input Damping*" value that you would like for the instrument to change to (allowable range from 0 to 100 sample).

Outputs:

Analog Inp Damping Out is decimal string with instrument's current "*Analog Input Damping*" parameter value.

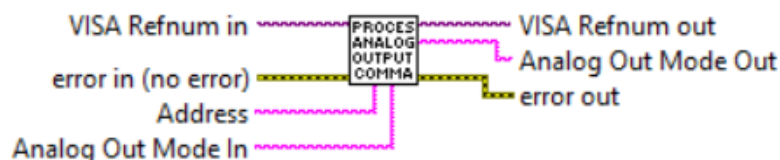
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.9.3 Process Analog Output Command

Process Analog Output Command (SubVI).vi



Reads/writes instrument's Analog Output interface type parameter.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Set Analog Out Mode In is a decimal string specifying the analog output type that you would like for the instrument to change to. Following *Analog Output* modes are available:

"0" - 0-5 Vdc

"1" - 0-10 Vdc

"2" - 4-20 mA

To read current "Analog Output Mode" settings do not wire anything to "Analog Out Mode In" terminal.

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4.9.4 Read Analog Output Alarm

Read Analog Output Alarm (SubVI).vi



Reads Analog Output interface Alarm Status.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Analog Out Alarm is a one ASCII character string with instrument's current "*Analog Out Alarm*" parameter value:

"N" - No Alarm (normal operation);

"Y" - Alarm is On (Abnormal Analog Output circuitry conditions are detected).

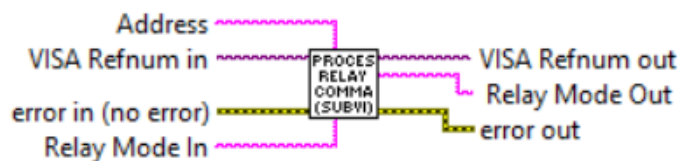
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.9.5 Process Relay Command

Process Relay Command (SubVI).vi



Reads/writes *Solid State Relay* assignment parameter. See Table XXII in the DPM/DPC operating manual for valid ASCII strings values which can be wired to the "*Relay Mode In*" terminal. Leave "*Relay Mode In*" input terminal open to read current status.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Relay Mode In is a string specifying the Solid State Relay assignment parameter value that you would like for the instrument to change to. See Table XXII in the DPM/DPC operating manual for valid ASCII strings values which can be wired to the "*Relay Mode In*" terminal.

Outputs:

Relay Mode Out is a string with instrument's current "*Relay Mode*" parameter value.

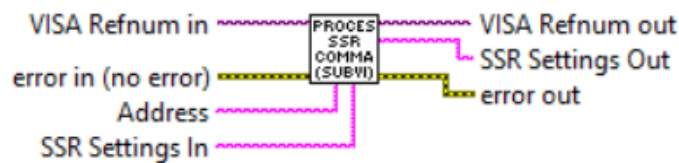
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

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4.9.6 Process SSR Command

Process SSR Command (SubVI).vi



Reads/writes *Solid State Relay* assignment parameter. See Table XXII in the DPM/DPC operating manual for valid ASCII strings values which can be wired to the "SSR Settings In" terminal. Leave "SSR Settings In" input terminal open to read current status.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

SSR Settings In is a string specifying the Solid State Relay assignment parameter value that you would like for the instrument to change to. See Table XXII in the DPM/DPC operating manual for valid ASCII strings values which can be wired to the "SSR Settings In" terminal.

Outputs:

SSR Settings Out is a string with instrument's current "Relay Mode" parameter value.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

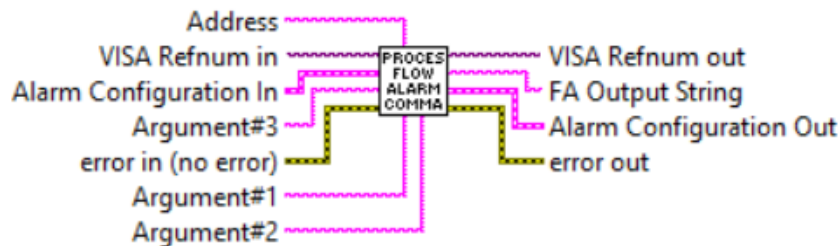
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

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4.10 Alarms

4.10.1 Process Flow Alarm Command

Process Flow Alarm Command (SubVI).vi



Reads and writes Flow Alarm parameters. Refer to ASCII commands set in the DPM/DPC operating manual for proper values of the strings wired to the Argument#1, Argument#2 and Argument#3 inputs. This Sub-VI parsing output data frame and updates corresponding parameters of the Flow Alarm cluster.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is the (string with one ASCII character) specifying the *Flow Alarm* parameter that you would like for the instrument to read or to change to.

Argument#2 is the (string) specifying the value for particular *Flow Alarm* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the *Argument#1*.

Argument#3 is the optional (string) specifying the value for particular *Flow Alarm* parameter that you would like for the instrument to change to.

Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for *Argument#1*, *Argument#2* and *Argument#3* terminals.

Alarm Configuration In is a cluster of 6 strings containing the information regarding instrument's *Flow Alarm* parameters.

Outputs:

FA Output String is a string output that contain the value of the parameter wired to the *Argument#1* input terminal. If "S" string is wired to *Argument#1* the output is a string with coma delimited *Flow Alarm* parameters values.

Alarm Configuration Out is a cluster of 6 strings containing updated information regarding instrument's *Flow Alarm* parameters.

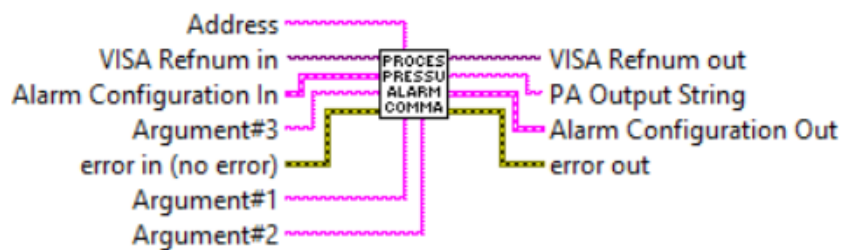
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.10.2 Process Pressure Alarm Command

Process Pressure Alarm Command (SubVI).vi



Reads and writes Pressure Alarm parameters. Refer to ASCII commands set in the DPM/DPC operating manual for proper values of the strings wired to the *Argument#1*, *Argument#2* and *Argument#3* inputs. This Sub-VI parsing output data frame and updates corresponding parameters of the Pressure Alarm cluster.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "*Address String*" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is the (string with one ASCII character) specifying the *Pressure Alarm* parameter that you would like for the instrument to read or to change to.

Argument#2 is the (string) specifying the value for particular *Pressure Alarm* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the *Argument#1*.

Argument#3 is the optional (string) specifying the value for particular *Pressure Alarm* parameter that you would like for the instrument to change to.

Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for *Argument#1*, *Argument#2* and *Argument#3* terminals.

Alarm Configuration In is a cluster of 6 strings containing the information regarding instrument's *Pressure Alarm* parameters.

Outputs:

PA Output String is a string output that contain the value of the parameter wired to the *Argument#1* input terminal. If "S" string is wired to *Argument#1* the output is a string with coma delimited *Pressure Alarm* parameters values.

Alarm Configuration Out is a cluster of 6 strings containing updated information regarding instrument's *Pressure Alarm* parameters.

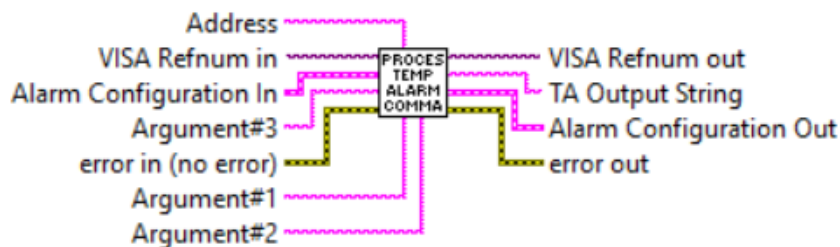
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.10.3 Process Temp Alarm Command

Process Temp Alarm Command (SubVI).vi



Reads and writes Temperature Alarm parameters. Refer to ASCII commands set in the DPM/DPC operating manual for proper values of the strings wired to the *Argument#1*, *Argument#2* and *Argument#3* inputs. This Sub-VI parsing output data frame and updates corresponding parameters of the Temperature Alarm cluster.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is the (string with one ASCII character) specifying the *Temperature Alarm* parameter that you would like for the instrument to read or to change to.

Argument#2 is the (string) specifying the value for particular *Temperature Alarm* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the *Argument#1*.

Argument#3 is the optional (string) specifying the value for particular *Temperature Alarm* parameter that you would like for the instrument to change to.

Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for *Argument#1*, *Argument#2* and *Argument#3* terminals.

Alarm Configuration In is a cluster of 6 strings containing the information regarding instrument's *Temperature Alarm* parameters.

Outputs:

TA Output String is a string output that contain the value of the parameter wired to the *Argument#1* input terminal. If "S" string is wired to *Argument#1* the output is a string with coma delimited *Temperature Alarm* parameters values.

Alarm Configuration Out is a cluster of 6 strings containing updated information regarding instrument's *Temperature Alarm* parameters.

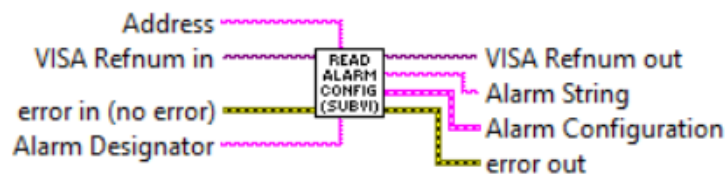
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.10.4 Read Alarm Configuration

Read Alarm Configuration (SubVI).vi



Reads Alarm configuration parameters from instrument EEPROM memory. This Sub-VI writes corresponding Alarm Status command, reads back instrument's response and parsing it to the *Alarm Configuration* cluster.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Alarm Designator is a one ASCII character string specifying particular Alarm parameters you would like to read from the instrument's memory. Wire to "Alarm Designator" terminal following strings:

"F" to read Flow Alarm Configuration.

"P" to read Pressure Alarm Configuration.

"T" to read Temperature Alarm Configuration.

Outputs:

Alarm String is a string with coma delimited output data frame representing requested Alarm settings.

Alarm Configuration is a cluster of 6 strings which represents Alarm parameters. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) for details.

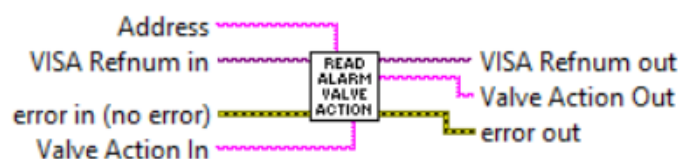
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.10.5 Read Alarm Valve Action

Read Alarm Valve Action (SubVI).vi



Reads and writes Flow Alarm *Valve Action* parameter.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Valve Action In is a decimal string specifying the Flow Alarm *Valve Action* parameter value that you would like for the DPC instrument to change to. Valid decimal string values for "Valve Action" are:

- 0 - Disabled;
- 1 - High Alarm;
- 2 - Low Alarm.

Outputs:

Valve Action Out is the reply string with requested instrument's Flow Alarm *Valve Action* parameter value.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

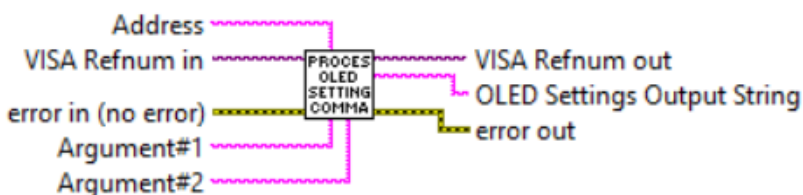
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.11 OLED Display Settings

4.11.1 Process OLED Settings Command

Process OLED Settings Command (SubVI).vi



Sets/Reads instrument OLED display parameters.

NOTE: OLED display is optional (make sure your instrument is equipped with OLED/ Joystick interface). Refer to DPM/DPC ASCII commands set (Table XXII) in operating manual for details regarding valid arguments values for L command.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is the (string with one ASCII character) specifying the *OLED Display* parameter that you would like for the instrument to read or to change to.

Argument#2 is the (string) specifying the value for particular *OLED Display* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the *Argument#1*.

Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine "L" command valid values for *Argument#1* and *Argument#2* terminals.

Outputs:

OLED Settings Output String is a string output that contains the value of the parameter wired to the *Argument#1* input terminal.

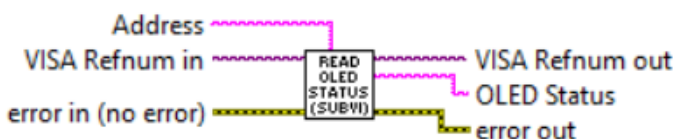
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.11.2 Read OLED Status

Read OLED Status (SubVI).vi



Queries the instrument to determine status of the OLED/Joystick interface presence. Returns "Y" if OLED display is installed and "N" if instrument is not equipped with OLED display.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

OLED Status is one ASCII character string with instrument's *OLED Status* [Y/N].

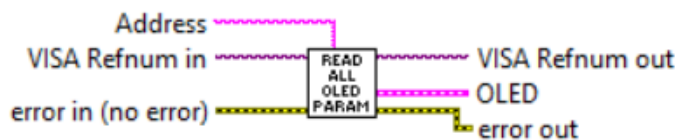
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.11.3 Read All OLED Parameters

Read All OLED Parameters (SubVI).vi



This SubVI is using "Process OLED Settings Command (SubVI)" to acquire all available OLED display settings in to the OLED cluster.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

OLED is a cluster of 11 elements with all OLED supported parameters.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.11.4 Convert Screen Mask to Number

Convert Screen Mask to Number (SubVI).vi



Converts OLED Process Information Screen Mask check box controls states to hex strings.

Inputs:

PI Screen Mask is a cluster of 8 boolean elements which represents status (Enabled/ Disabled) for all 8 OLED PI screens.

Outputs:

Screen Mask Hex String is a 6 characters hex string with PI Screen Mask register value.

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4.11.5 Convert Seconds to MinSec

Convert Seconds to MinSec (SubVI).vi



Converts time interval expressed in number of seconds to minutes and seconds notation. This Sub-VI is required to make time interval conversion because DPM/DPC reports this parameters only as decimal string with number of seconds values.

Inputs:

Seconds In is a decimal string representing number of seconds value.

Outputs:

Minutes is an unsigned long (32 bit) integer representing number of minutes.

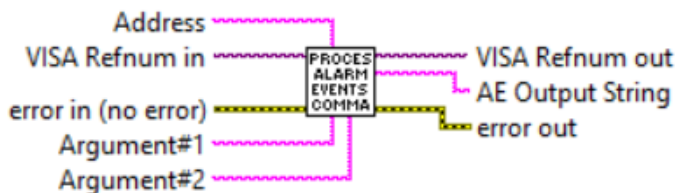
Seconds is an unsigned long (32 bit) integer representing number of seconds.

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4.12 Alarm Events

4.12.1 Process Alarm Events Command

Process Alarm Events Command (SubVI).vi



Reads and writes *Alarm Events* registers. This Sub-VI is using ASCII commands set. If *Argument#1* and *Argument#2* are not wired the Sub-VI returns AE status register value. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine "AE" command valid values for *Argument#1* and *Argument#2* terminals.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is a string with one ASCII character specifying the *Alarm Events* parameter that you would like for the instrument to read or to change to.

Argument#2 is a string specifying the value for particular *Alarm Events* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the *Argument#1*.

Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine "AE" command valid values for *Argument#1* and *Argument#2* terminals.

Outputs:

AE Output String is a string output that contains the value of the parameter wired to the *Argument#1* input terminal.

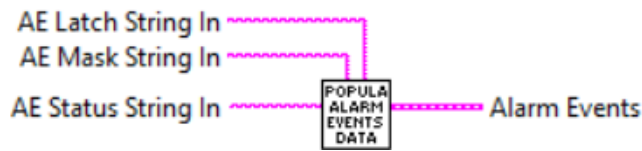
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.12.2 Populate Alarm Events Data

Populate Alarm Events Data (SubVI).vi



Converts hex strings from Alarm Events registers to Arrays and updates Alarm Events cluster.

Inputs:

AE Latch String In is a 6 characters hex string with Alarm Events *Latch* register value.

AE Mask String In is a 6 characters hex string with Alarm Events *Mask* register value.

AE Status String In is a 6 characters hex string with Alarm Events *Status* register value.

Outputs:

Alarm Events is a cluster with Alarm Events parameters updated according to the input AE registers values.

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4.12.3 Update Alarm Events Indicators

Update Alarm Events Indicators (SubVI).vi



Updates Status indicators of the Alarm Events cluster base on Alarm Events *Status* register value wired to *AE Status String In* terminal.

Inputs:

AE Status String In is a 6 characters hex string with Alarm Events *Status* register value.

Alarm Events In is a cluster with Alarm Events parameters to be updated.

Outputs:

Alarm Events Out is a cluster with Alarm Events parameters updated according to the input *AE Status* register value.

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4.12.4 Convert Alarm Events to Number

Convert Alarm Events to Number (SubVI).vi



Converts Alarm Events *Mask* and *Latch* controls state of the *Alarm Events Cluster* to hex strings.

Inputs:

Alarm Events In is a cluster with Alarm Events parameters to be converted.

Outputs:

Enable Hex String is a 6 characters hex string with Alarm Events Mask register value.

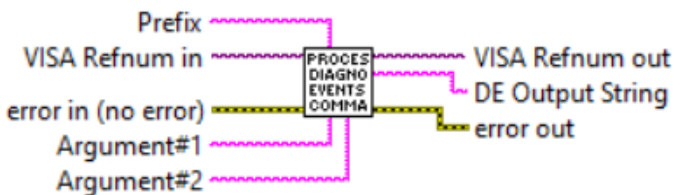
Latch Hex String is a 6 characters hex string with Alarm Events *Latch* register value.

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4.13 Diagnostic Events

4.13.1 Process Diagnostic Events Command

Process Diagnostic Events Command (SubVI).vi



Reads and writes *Diagnostic Events* registers. This Sub-VI is using ASCII commands set. If *Argument#1* and *Argument#2* are not wired the Sub-VI returns DE status register value. Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine "DE" command valid values for *Argument#1* and *Argument#2* terminals.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is a string with one ASCII character specifying the *Diagnostic Events* parameter that you would like for the instrument to read or to change to.

Argument#2 is a string specifying the value for particular *Diagnostic Events* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the *Argument#1*.

Refer to DPC ASCII commands set (Table XXII in the DPC operating manual) to determine "DE" command valid values for *Argument#1* and *Argument#2* terminals.

Outputs:

DE Output String is a string output that contains the value of the parameter wired to the *Argument#1* input terminal.

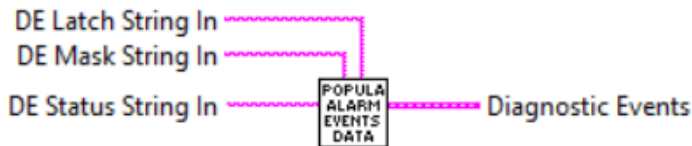
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.13.2 Populate Diagnostic Events Data

Populate Diagnostic Events Data (SubVI).vi



Converts hex strings from Diagnostic Events registers to Arrays and updates Diagnostic Events cluster.

Inputs:

DE Latch String In is a 6 characters hex string with Diagnostic Events *Latch* register value.

DE Mask String In is a 6 characters hex string with Diagnostic Events *Mask* register value.

DE Status String In is a 6 characters hex string with Diagnostic Events *Status* register value.

Outputs:

Diagnostic Events is a cluster with Diagnostic Events parameters updated according to the input DE registers values.

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4.13.3 Update Diagnostic Events Indicators

Update Diagnostic Events Indicators (SubVI).vi



Updates Status indicators of the Diagnostic Events cluster base on Diagnostic Events *Status* register value wired to *DE Status String In* terminal.

Inputs:

DE Status String In is a 6 characters hex string with Diagnostic Events *Status* register value.

Diagnostic Events In is a cluster with Diagnostic Events parameters to be updated.

Outputs:

Diagnostic Events Out is a cluster with Diagnostic Events parameters updated according to the input *DE Status* register value.

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4.13.4 Convert Diagnostic Events to Number

Convert Diagnostic Events to Number (SubVI).vi



Converts Diagnostic Events *Mask* and *Latch* controls state of the *Diagnostic Events Cluster* to hex strings.

Inputs:

Diagnostic Events In is a cluster with Diagnostic Events parameters to be converted.

Outputs:

Enable Hex String is a 6 characters hex string with Diagnostic Events *Mask* register value.

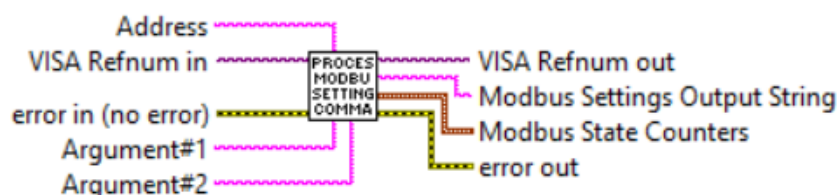
Latch Hex String is a 6 characters hex string with Diagnostic Events *Latch* register value.

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4.14 Modbus

4.14.1 Process Modbus Settings Command

Process Modbus Settings Command (SubVI).vi



Sets/Reads instrument's ModBus RS485 interface communication parameters (baud rate, parity, stop bits) and address.

NOTE: ModBus interface is optional (make sure your instrument is equipped with Modbus RJ45 interface connector). Refer to DPM/DPC ASCII commands set (Table XXII) in operating manual for details regarding Argument#1 and Argument#2 values required for MB command.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is a string with one ASCII character specifying the *Modbus* parameter that you would like for the instrument to read or to change to.

Argument#2 is a string specifying the value for particular *Modbus* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the *Argument#1*.

Outputs:

Modbus Settings Output String is a string output that contains the value of the parameter wired to the *Argument#1* input terminal.

Modbus State Counters is a cluster of 4 elements (long 32 bit integers) with Modbus diagnostic parameters.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

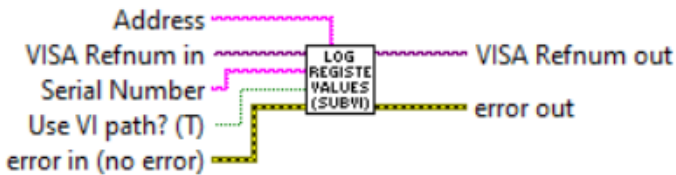
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.15 Data Logging

4.15.1 Log Registers Values

Log Registers Values (SubVI).vi



Reads the value of each EEPROM configuration register, and stores the values in a text file. Generates file name as a time-stamp (by default saves it to the current working directory).

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Serial Number is a string with instrument's serial number to be included in the auto-generated file name. If left open then only time stamp will be included in the auto-generated file name.

Use VI path? (T) is a Boolean control that determines if the sub-VI will use an auto-generated file name (with the serial number and a time stamp) and save it in the folder from which it was run (TRUE), or if user action is needed to specify a file name and path (FALSE).

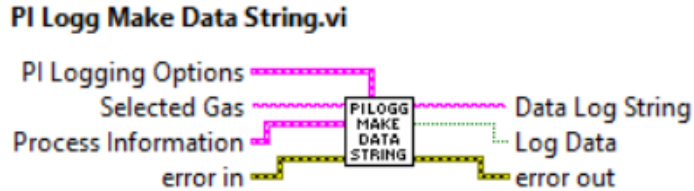
Outputs:

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.15.2 PI Logg Make Data String



Generates a comma delimited string from the data based on the logging options selected. This is for use with AALBORG LabVIEW's examples which utilize *Data Log* feature.

Inputs:

PI Logging Options is a required input cluster that represents the desired data logging options.

Process Information is a required input cluster containing all of the measurement data that is output from the "Compose PI Data" sub-VI.

Selected Gas is a string with instrument's currently selected gas name.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Outputs:

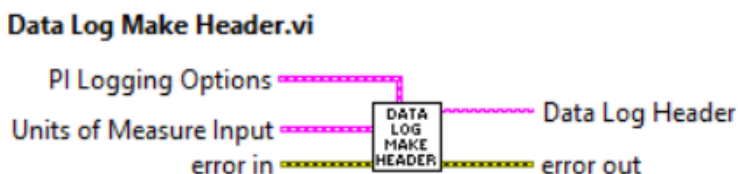
Data Log String is a comma delimited data string containing the variables selected with the "PI Logging Options" input.

Log Data returns the boolean value located in the "PI Logging Options" input for ease of use (to avoid needing to unbundle the cluster) and can be used to determine whether or not to log the output *Data Log String* string to a data file.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.15.3 Data Log Make Header



Generates a header string for use with data logging. Output will be a comma delimited string containing labels of the variables (and the units of measure, if selected) for the data logging options selected. This is for use with AALBORG LabVIEW's examples which utilize Data Log feature.

Inputs:

PI Logging Options is a required input cluster that represents the desired data logging options.

Units of Measure Input is a cluster containing the currently selected units of measure strings for each PI variable supported by the instrument.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Outputs:

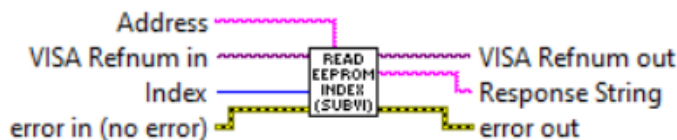
Data Log Header is a comma delimited string containing the data column headers for each PI variable selected with the "PI Logging Options" input.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.15.4 Read EEPROM Index

Read EEPROM Index (SubVI).vi



Read the value of the single EEPROM register. The valid values for register *Index* input are from 0 to 413.

Inputs:

Index is a required (unsigned long integer) input and should contain the EEPROM register index that is to be read out from the instrument's nonvolatile memory. The valid values for register *Index* input are from 0 to 413.

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Response String is the returned data string with register value stored in the specified EEPROM register.

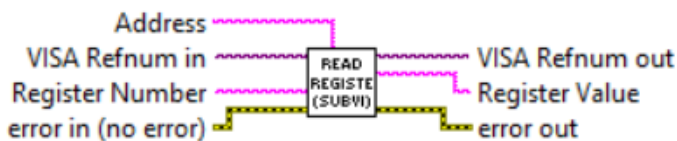
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.15.5 Read Register

Read Register (SubVI).vi



Read the value of the single EEPROM register. This Sub-VI is similar to "Read EEPROM Index" Sub-VI but instead unsigned long integer input for *Index* has decimal string input.

Inputs:

Register Number is a required (decimal string) input and should contain the EEPROM register index that is to be read out from the instrument's nonvolatile memory. The valid values for register *Index* input are from 0 to 413.

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Outputs:

Register Value is the returned data string with register value stored in the specified EEPROM register.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

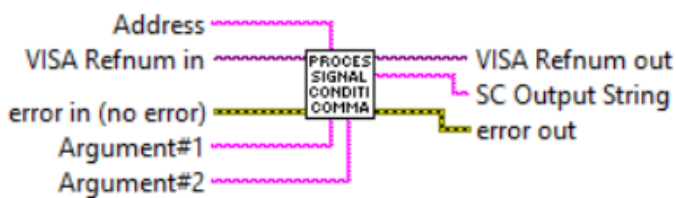
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.16 Signal Conditioner

4.16.1 Process Signal Conditioner Command

Process Signal Conditioner Command (SubVI).vi



Reads/writes instrument's *Signal Conditioner* (filter) parameters. Refer to DPM/DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for "SC" command *Argument#1* and *Argument#2* input terminals.

Note: The Advance NLES signal conditioner parameters were set on the factory to keep best performance. Do not change Signal Conditioner parameters unless instructed by factory technical support representative! Consult with factory for more information.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is a string with one ASCII character specifying the *Signal Conditioner* parameter that you would like for the instrument to read or to change to.

Argument#2 is a string specifying the value for particular *Signal Conditioner* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the *Argument#1*.

Outputs:

SC Output String is a string output that contains the value of the *Signal Conditioner* parameter wired to the *Argument#1* input terminal.

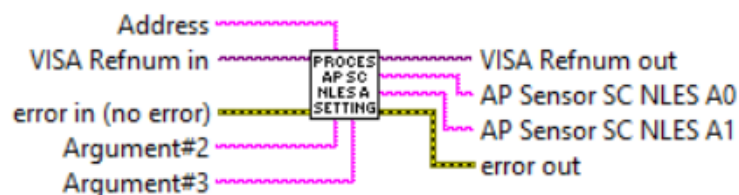
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.16.2 Process AP SC NLES A Settings

Process AP SC NLES A Settings (SubVI).vi



Reads/writes instrument's *Not Linear Exponential Noise Reduction Filter* A0 and A1 parameters. Refer to DPM/DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for "SC" command *Argument#2* and *Argument#3* input terminals.

Note: The *Advance NLES* signal conditioner parameters were set on the factory to keep best performance. Do not change *Signal Conditioner* parameters unless instructed by factory technical support representative! Consult with factory for more information.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#2 is a floating point string specifying the *Signal Conditioner NLES "a0"* parameter value that you would like for the instrument to change to.

Argument#3 is a floating point string specifying the *Signal Conditioner NLES "a1"* parameter value that you would like for the instrument to change to. Leave both *Argument#2* and *Argument#3* inputs open to read current value of the *NLES a0* and *a1* parameters.

Outputs:

AP Sensor SC NLES A0 is a floating point string output that contains the value of the *Signal Conditioner NLES a0* parameter.

AP Sensor SC NLES A1 is a floating point string output that contains the value of the *Signal Conditioner NLES a1* parameter.

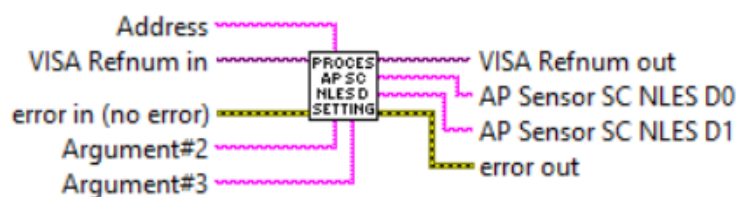
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.16.3 Process AP SC NLES D Settings

Process AP SC NLES D Settings (SubVI).vi



Reads/writes instrument's *Not Linear Exponential Noise Reduction Filter D0* and *D1* parameters. Refer to DPM/DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for "SC" command *Argument#2* and *Argument#3* input terminals.

Note: The *Advance NLES* signal conditioner parameters were set on the factory to keep best performance. Do not change *Signal Conditioner* parameters unless instructed by factory technical support representative! Consult with factory for more information.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#2 is a floating point string specifying the *Signal Conditioner NLES "d0"* parameter value that you would like for the instrument to change to.

Argument#3 is a floating point string specifying the *Signal Conditioner NLES "d1"* parameter value that you would like for the instrument to change to. Leave both *Argument#2* and *Argument#3* inputs open to read current value of the *NLES d0* and *d1* parameters.

Outputs:

AP Sensor SC NLES D0 is a floating point string output that contains the value of the *Signal Conditioner NLES d0* parameter.

AP Sensor SC NLES D1 is a floating point string output that contains the value of the *Signal Conditioner NLES d1* parameter.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

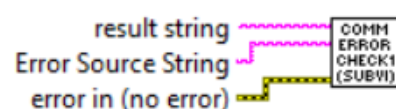
Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.17 Utilities

4.17.1 Comm Error Check1

Comm Error Check1 (SubVI).vi



Checks instrument reply message (must be wired to the "result string" input terminal) and looking for "ERROR#" string in instrument's reply message. If found displays dialog box with message string wired to the "Error Source String" terminal.

NOTE: This Sub-VI will block program execution if instrument replies with error message. If your application should not be interrupted do not use this Sub-VI.

Inputs:

result string is a string with instrument's reply message to be evaluated.

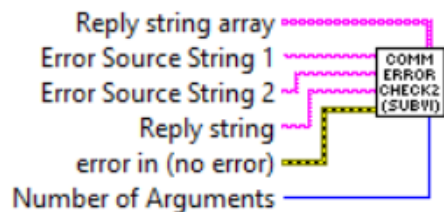
Error Source String is a string with message you want to be displayed in the dialog box when "ERROR#" is found in the instrument's reply message.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

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4.17.2 Comm Error Check2

Comm Error Check2 (SubVI).vi



Checks instrument reply message (must be wired to the "result string" input terminal) and looking for "ERROR#" string. If found displays dialog box with message string wired to the "Error Source String" terminal. In addition, it checks number of the element in the array wired to the "Reply String Array" terminal and compares it with "Number of Element" value. If not equal provides additional message (the text of the message must be wired to the "Error Source #2" terminal) in the dialog box. This SubVI can be used to verify coma delimited string reply message (must be converted in to array of strings).

NOTE: This Sub-VI will block program execution if instrument replies with error message or number of the elements in the "Reply String Array" is not equal to the number wired to the "Number of Argument" terminal . If your application should not be interrupted do not use this Sub-VI.

Inputs:

Reply string is a string with instrument's reply message to be evaluated.

Error Source String 1 is a string with message you want to be displayed in the dialog box when "ERROR#" is found in the instrument's reply message.

Error Source String 2 is a string with message you want to be displayed in the dialog box when number of the elements in the "Reply String Array" is not equal to the number wired to the "Number of Argument" terminal.

Reply string array is a array of strings to be evaluated. To evaluate coma delimited string reply message it must be first converted in to array of strings.

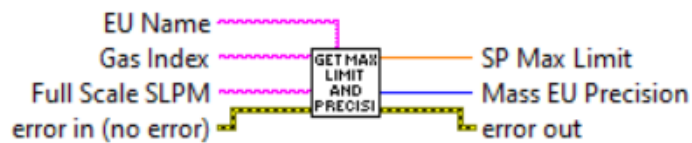
Number of Arguments is an unsigned long integer which specifies how many elements should be in the "Reply string array".

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

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4.17.3 Get Max Limit and Precision

Get Max Limit and Precision (SubVI).vi



Calculates Set Point Value *Precision* (number of digits after decimal point) and Set Point permissible maximum value in currently selected mass flow engineering units. Converts mass flow PFS ([0.0-100.0%] notation) value to the currently selected Mass Flow EU (at STP or NTP conditions). The maximum permissible set point value for DPC controllers is 124.99% of full scale. This VI has to be run in the beginning of the instrument initialization and each time the instrument selected gas or mass flow EU are changed.

Inputs:

EU Name is a string with currently selected mass flow units of measure name (required input).

Gas Index is a numerical string with index of the currently selected gas (required input). Valid values are from 0 to 128.

Full Scale SLPM is a floating point string with instrument's full scale range value expressed in sl/min units of measure (required input). Instrument full scale range parameter can be obtained with "Read Device Info" sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Outputs:

SP Max Limit is a maximum mass flow value (double) expressed in the mass flow units of measure wired to the "EU Name" terminal.

Mass EU Precision is mass flow precision value (unsigned long 32 bit integer) which represents number of digits after decimal point calculated for mass flow units wired to the "EU Name" input terminal.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.17.4 Get Mass Flow EU Precision

Get Mass Flow EU Precision (SubVI).vi



Calculates precision of the mass flow reading or set point value based on selected instrument "EU Name", "Full Scale Range in SLPM" and "Gas Index" parameters. This Sub-VI has to be run in the beginning of the instrument initialization and each time the instrument selected gas or mass flow EU are changed.

Inputs:

EU Name is a string with currently selected mass flow units of measure name (required input).

Gas Index is a numerical string with index of the currently selected gas (required input). Valid values are from 0 to 128.

Full Scale SLPM is a floating point string with instrument's full scale range value expressed in sl/min units of measure (required input). Instrument full scale range parameter can be obtained with "Read Device Info" sub-VI.

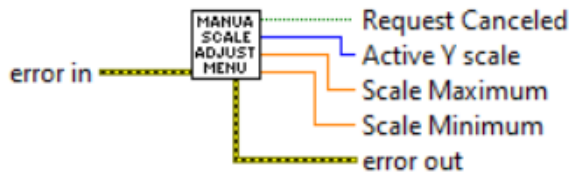
Outputs:

Mass EU Precision is mass flow precision value (unsigned long 32 bit integer) which represents number of digits after decimal point calculated for mass flow units wired to the "EU Name" input terminal.

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4.17.5 Manual Scale Adjustment Menu

Manual Scale Adjustment Menu.vi



Adjustment menu for manually setting the chart scales for a desired variable. Used in the *DPCM Extended Driver Example with Chart*.

Inputs:

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Outputs:

Request Canceled is a Boolean that indicates whether the user canceled the menu selection.

Active Y scale indicates what chart to alter (the numbering is based on the chart in the *DPCM Extended Driver Example with Chart VI*).

Scale Minimum is the new minimum (double) that should be associated with the given active Y scale.

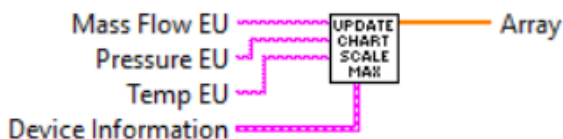
Scale Maximum is the new maximum (double) that should be associated with the given active Y scale.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.17.6 Update Chart Scale Max Limit

Update Chart Scale Max Limit (SubVI).vi



Calculates maximum chart scale values for Mass Flow, Temperature and Pressure variables based on selected units of measure. This Sub-VI is used in the *DPCM Extended Example with Waveform Chart VI*.

Inputs:

Mass Flow EU is a string with currently selected mass flow units of measure name (required input).

Pressure EU is a string with currently selected pressure units of measure name (required input).

Temp EU is a string with currently selected temperature units of measure name (required input).

Device Information is a cluster of strings containing the information regarding instrument's configuration parameters (can be obtained with *Read Device Configuration* Sub-VI).

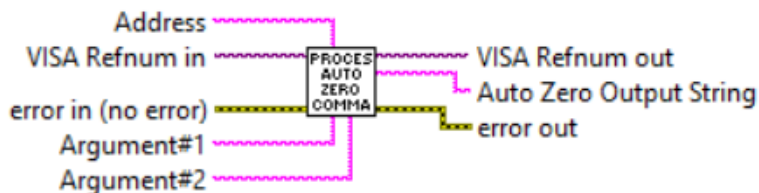
Outputs:

Array is a 1D array of calculated scale maximum values (double) that should be associated with the corresponding Y scale.

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4.17.7 Process Auto Zero Command

Process Auto Zero Command (SubVI).vi



Performs Tare function for DPM/DPC internal differential (DP) and absolute (AP) pressure sensors. Refer to DPM/DPC ASCII commands set (Table XXII in the DPC operating manual) to determine valid values for "Argument#1" and "Argument#2" input terminals.

WARNING: Make sure absolutely no flow through the instrument during pressure sensor tare procedure. Make sure inlet and outlet fittings are open to the atmosphere! When performing tare for Absolute Pressure sensor Argument#2 must be AP value from Reference Standard.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Argument#1 is a string with one ASCII character specifying the *Auto Zero* parameter that you would like for the instrument to read or to change to.

Argument#2 is a string specifying the value for particular *Auto Zero* parameter that you would like for the instrument to change to. Leave this input open to read current value of the parameter specified in the Argument#1.

Outputs:

Auto Zero Output String is a string output that contains the value of the *Auto Zero* parameter wired to the Argument#1 input terminal.

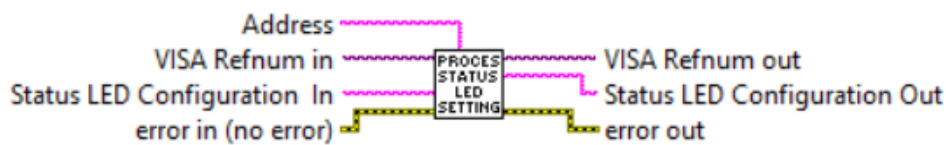
VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

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4.17.8 Process Status LED Settings

Process Status LED Settings (SubVI).vi



Reads/writes operational mode of the instrument's "*Status LED*" parameter. Leave "*Status LED Configuration In*" input terminal open to read current status.

Inputs:

VISA Refnum in is a required input, and is initially generated from the *Init COM Port* sub-VI.

Error In is the error cluster input, and should be connected to this VI from the error output of the previously called VI.

Address is input string which represents instrument address. When wired to the "Address String" output terminal of the *Init COM Port* sub-VI the address prefix will be automatically created based on values of the *Interface Type* and *Address* controls.

Status LED Configuration In is the decimal string specifying the *Status LED Configuration* that you would like for the DPM/DPC instrument to change to. Leave this input open to read current value of the *Status LED Configuration* parameter.

Wire to "Status LED Configuration In" input terminal following decimal string:

- 0 - Normal operation;
- 1 - Flow Alarm & Totalizers events only;
- 2 - Alarm Events only;
- 3 - Diagnostic Events;
- 4 - UART interface events;
- 5 - ModBus interface events.

Outputs:

Status LED Configuration Out is a decimal string representing current *Status LED Configuration* settings.

VISA Refnum out is the output VISA session reference which should be wired to the *VISA Refnum in* terminals of subsequent AALBORG sub-VI's.

Error Out is the error cluster output, and contains information on the errors (if any) that occurred when executing this sub-VI. This terminal should be connected to the error input of the next called sub-VI.

4.17.9 Global VI

Global.vi



This VI contains all global arrays used for engineering units conversion and mass flow precision calculations in many AALBORG DPM/DPC LabVIEW driver examples and Sub-VIs included in this library.

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5. Example Programs

5.1 DPCM Extended Driver Example with Chart and DataLog

The screenshot displays a comprehensive control interface for a DPCM instrument. Key sections include:

- Serial Configuration:** Set to COM3, Baud Rate 38400, RS-485 Address 11.
- Set Point Options:** Setpoint Value 50.000 %FS, Source Digital, Valve Mode Auto.
- Totalizer #1 Options:** Enabled, Start @ Flow 2 %FS, Action Volume 0.5 %s, Current Volume 686.55 %s.
- Flow Alarm:** Enabled, Status D, High Alarm Limit 15 %FS, Low Alarm Limit 10 %FS.
- Process Information:** Set Point 50.000 %FS, Mass Flow 50.03 %FS, Volum. Flow 51.20 %FS, Totalizer #1 686.55 %s, Totalizer #2 4350.85 %s, Gas Temp. 24.16 C, Gas Pressure 14.51 PSIA.
- Measuring Units:** Mass Flow Units %FS, Vol. Flow Units %FS, Pressure Units PSIA, Temperature Units Celsius.
- PI Logging Options:** Includes checkboxes for Set Point, Valve Counts, Mass Flow, Volumetric Flow, Totalizer#1, Totalizer#2, Gas Temperature, Gas Pressure, Flow Alarm, Temp. Alarm, Pressure Alarm, Alarm Events, Diagnostic Events, and Selected Gas.
- Alarm Events:** A grid of checkboxes for various alarm conditions like High Flow Alarm, Low Flow Alarm, Flow between H & L, etc.
- User Defined Gas Mixture input:** Configured for 5 gases (all Air) with ratios 0, 0, 0, 0, 0. Mixture name: MyMix1.

The central chart shows a step function for the Set Point (red line) and corresponding responses in Mass (green), Volumetric Flow (blue), Temperature (yellow), and Pressure (purple). The bottom status bar provides a summary of the instrument's current configuration and status.

This example program utilizes almost all Sub-VI's included in the *AALBORG DPCM LabView Driver Library*. In addition to the extended program example it provides access to the PI data *Waveform Chart*, *User Defined Gas Mixture*, *Alarm Events* and *Process Information* data logging settings and features of the DPM and DPC instruments. To connect to DPM/DPC instrument, simply select the appropriate COM port that the instrument is connected to and ensure that the *Interface Type (RS-232 or RS-485)*, *Address* and *Baud Rate* controls are set to match the values on the DPM/DPC instrument that you would like to talk to.

NOTE: Address is not required when instrument is connected over RS-232 interface.

This example VI will continually try opening the COM port and querying for a connected instrument response. If no DPM/DPC instrument is connected that matches these settings, the program will close the COM port, wait for a given amount of time and retry.

Once a connection to an DPM/DPC instrument is established, the program will query the current device settings and use these to populate the VI's controls, disabling controls that are not valid with the connected instrument (for example if connected instrument is DPM meter all controls that corresponds to controller will be disabled). During instrument's initialization phase, a text box will appear with the message to indicate that the connection is established and that the VI panel is populating with the device information.

Possible Issues

- When communicating with instruments over RS-485 interface and "*Read Valve Output*" check box is selected some times it is possible to get "*Communication Error*" message when low "*Baud Rate*" settings are selected. In this case use 19200 or higher "*Baud Rate*" settings to be able to faster transfer long data frames to and from the instrument.
- Do not use "*Update Time*" settings with values below **50 ms**. Doing so especially with low "**Baud Rate**" settings may result in communication error.

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5.2 DPCM Driver Example with PID Autozero PSP and OLED settings

This example program utilizes almost all VI's included in the AALBORG DPCM LabView Driver Library. In addition to the extended program example it provides access to the *OLED Display*, *Valve PID settings*, *Flow and Pressure sensors Tare procedure*, *Program Set Point parameters*, *PI data Waveform Chart*, *User Defined Gas Mixture* and *Process Information* data logging settings and features of the DPM and DPC instruments. In this example *Totalizers* and *Pulse Outputs* control tabs are replaced with "OLED Settings", "AutoZero" and "PID Settings" controls and "Alarm Events" cluster is replaced with "Program Set Point" cluster.

The screenshot shows the Aalborg Instruments & Controls Inc. DPCM LabView interface. The interface is divided into several panels:

- Serial Configuration:** Serial Port # (COM3), Baud Rate (38400), RS-485 Address (11).
- Set Point Options:** Setpoint Value (0.000 %FS), Setpoint Source (PSP), Valve Mode (Auto).
- OLED Settings:** PI Screen Mask (checked), Flow Rate Precision (Normal), Display Mode (Static), Operational Brightness (128), Screen Saver Delay (15 min.), Screen Cycle Interval (5 s), Scrolling (checked).
- AutoZero:** Flow Rate Filter (5), Flow Rate Dead Band (0.01 %), Screen Saver Delay (15 min.), Screen Cycle Interval (5 s).
- PID Settings:** Flow Rate Precision (Normal), Display Mode (Static), Operational Brightness (128), Screen Saver Delay (15 min.), Screen Cycle Interval (5 s).
- Flow, Temp., Pressure:** Flow Alarm (Enabled), Valve Action (High Alarm Limit), Flow Alarm Latch (unchecked), Action Delay (0 s), Power Up Delay (6 s).
- Process Information:** Set Point (0.00 %FS), Valve Counts (N/A), Mass Flow (0.18 %FS), Volum. Flow (0.19 %FS), Totalizer #1 (686.55 %s), Totalizer #2 (335876.13 %s), Gas Temp. (25.49 C), Gas Pressure (14.52 PSIA).
- SS Relay Assignment:** Disabled.
- Analog Output:** 0-5 Vdc.
- Analog Input:** 0-5 Vdc.
- PI Logging Options:** Set Point, Valve Counts, Mass Flow, Volumetric Flow, Totalizer#1, Totalizer#2, Gas Temperature, Gas Pressure, Flow Alarm, Temp. Alarm, Pressure Alarm, Alarm Events, Diagnostic Events, Selected Gas, Include Header.
- User Defined Gas Mixture input:** Gas #1-5 (Air), Ratio %1-5 (0), Mix. # (203), Mix. name (MyMix1).
- Table:**

| Stop PSP | 1 | SP[%FS] | Time [s] | E/D |
|----------|-----|---------|----------|-------------------------------------|
| 01 | 0 | 1 | | <input checked="" type="checkbox"/> |
| 02 | 0 | 5 | | <input checked="" type="checkbox"/> |
| 03 | 50 | 0 | | <input checked="" type="checkbox"/> |
| 04 | 50 | 5 | | <input checked="" type="checkbox"/> |
| 05 | 100 | 0 | | <input checked="" type="checkbox"/> |
| 06 | 100 | 5 | | <input checked="" type="checkbox"/> |
| 07 | 50 | 10 | | <input checked="" type="checkbox"/> |
| 08 | 50 | 5 | | <input checked="" type="checkbox"/> |
| 09 | 0 | 0 | | <input checked="" type="checkbox"/> |
| 10 | 50 | 10 | | <input type="checkbox"/> |
| 11 | 25 | 25 | | <input type="checkbox"/> |
| 12 | 25 | 10 | | <input type="checkbox"/> |
| 13 | 50 | 25 | | <input type="checkbox"/> |
| 14 | 50 | 10 | | <input type="checkbox"/> |
| 15 | 25 | 25 | | <input type="checkbox"/> |
| 16 | 25 | 10 | | <input type="checkbox"/> |
- Bottom Panel:** Device Function (Controller), Model Number (DPC17A-VAL6-A2), Serial Number (999001-2), Selected Gas (0,Air), Full Scale Range (0.00050 sl/min), Mass EU (%FS), Volum. EU (%FS), T1 (D), T2 (E), A Output (0-5Vdc), A Input (0-5Vdc), Modbus (No).

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5.3 DPCM Extended Driver Example with Diagnostic and DataLog

The screenshot displays the Aalborg Instruments & Controls Inc. software interface for a DPCM Extended Driver. The interface is organized into several functional sections:

- Serial Configuration:** Serial Port # (COM3), Baud Rate (38400), Address (RS-485: 11, RS-232).
- Set Point Options:** Setpoint Value (0.000 %FS), Setpoint Source (Digital), Valve Mode (Close).
- Totalizer #1 Options:** Enabled, Start @ Flow (2 %FS), Action Volume (6000 %s), Current Volume (686.55 %s). Includes checkboxes for 'Close Valve When Action Volume is Reached', 'Enable Auto Reset/Reload', and delay settings (Auto Reset Delay: 1s, Power Up Delay: 10s).
- Flow Alarm:** Enabled, Status (D), Valve Action (High Alarm Limit), High Alarm Limit (15 %FS), Low Alarm Limit (10 %FS). Includes 'Flow Alarm Latch' and 'Power Up Delay [s]' (6s).
- Process Information:** Set Point (0.000 %FS), Valve Counts (N/A Counts), Mass Flow (0.07 %FS), Volum. Flow (0.07 %FS), Totalizer #1 (686.55 %s), Totalizer #2 (335876.13 %s), Gas Temp. (24.43 C), Gas Pressure (14.55 PSIA).
- Measuring Units:** Mass Flow Units (%FS), Vol. Flow Units (%FS), Pressure Units (PSIA), Temperature Units (Celsius).
- SS Relay Assignment:** Disabled.
- Analog Output/Analog Input:** 0-5 Vdc.
- Diagnostic Events:** List of error conditions with checkboxes for Reset, E/D, and Latch.
- Alarm Events:** List of alarm conditions with checkboxes for Reset, E/D, and Latch.
- User Defined Gas Mixture input:** Total GM: 3. Gas #1-5 (Air), Ratio %1-5 (0), Enable #1-5. Includes 'Mix. #' (203), 'Mix. name' (MyMix1), and 'Create Mixture' button.
- PI Logging Options:** Checkboxes for Set Point, Valve Counts, Mass Flow, Volumetric Flow, Totalizer#1, Totalizer#2, Gas Temperature, Gas Pressure, Flow Alarm, Temp. Alarm, Pressure Alarm, Alarm Events, Diagnostic Events, and Selected Gas. Includes 'Log Data' button and 'Include Header' checkbox.
- Device Information:** Device Function (Controller), Model Number (DPC17A-VAL6-A2), Serial Number (999001-2), Selected Gas (0,Air), Full Scale Range (0.00050 sl/min), Mass EU (%FS), Volum. EU (%FS), T1 (D), T2 (E), A Output (0-5Vdc), A Input (0-5Vdc), Modbus (No).

In this example program the *Waveform Chart* feature is replaced with *Diagnostic Events* and *Alarm Events* functionality. The rest of the supported functions are the same as in the "DPCM Extended Driver Example with Chart and DataLog" example (see Paragraph 5.1) for more descriptions.

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5.4 DPCM Extended Driver Example

The screenshot displays the Aalborg Instruments & Controls Inc. DPCM Extended Driver software interface. The interface is organized into several functional panels:

- Serial Configuration:** Serial Port # is set to COM3, Baud Rate is 38400. RS-485 Address is 11, RS-232 Address is 11.
- Set Point Options:** Setpoint Value is 0.00000 SmL/min, Setpoint Source is Digital, Valve Mode is Close.
- Timing Options:** Update Time [ms] is 150, Measurement per second is 6.663. A STOP button is visible.
- Selected Gas:** Air is selected.
- Measuring Units:** Mass Flow Units: SmL/min, Vol. Flow Units: mL/min, Pressure Units: ,PSIA, Temperature Units: Celsius.
- Totalizer#1 Options:** Enabled, Start @ Flow: 2 %FS, Action Volume: 6000 SmL, Current Volume: 0.06 SmL. Includes checkboxes for Close Valve When Action Volume is Reached, Enable Auto Reset/Reload, and delay settings for Auto Reset Delay (1s) and Power Up Delay (10s).
- Flow Alarm:** Enabled, Status: D, Valve Action: Disabled, High Alarm Limit: 15 %FS, Low Alarm Limit: 10 %FS. Includes checkboxes for Flow Alarm Latch and Action Delay (0s), Power Up Delay (6s).
- SS Relay Assignment:** Disabled, Analog Output: 0-5 Vdc, Analog Input: 0-5 Vdc. A warning message states: "Before changing Analog Input or Output mode make sure proper equipment is connected to the corresponding pins on the interface connector!"
- Process Information:** Set Point: 0.000 SmL/min, Valve Counts: N/A, Mass Flow: -0.000 SmL/min, Volum. Flow: -0.000 mL/min, Totalizer #1: 0.057 SmL, Totalizer #2: 27.990 SmL, Gas Temp.: 23.99 C, Gas Pressure: 14.74 ,PSIA. Alarm Events and Diagnostic Events are both 0x0.
- Device Information:** Device Function: Controller, Model Number: DPC17A-VAL6-A2, Serial Number: 999001-2, Selected Gas: 0,Air, Full Scale Range: 0.00050 sl/min, Mass EU: SmL/min, Volum. EU: mL/min, T1: D, T2: E, A Output: 0-5Vdc, A Input: 0-5Vdc, Modbus: No.

Extended example program which allow user to select interface type, instrument address (only applicable for RS485 interface), initialize COM port, continuously read instrument *Process Information* data and write set point value to the DPC instruments. In addition it allows user to select flowing Gas, change units of measure, analog input and output interface type and SSR assignment. It also provides full access to programmable *Totalizers*, *Pulse Output*, *Flow*, *Pressure* and *Temperature* alarm settings. Once COM port is initialized the program reads instrument configuration information in to "*Device Information*" cluster and then it continuously reads PI data. In addition to read only simple VI example this program allows user to change "*Set Point Source*" parameter, "*Valve Mode*" parameter and "*Set Point*" value parameter during VI run time (these controls only enabled for DPC instruments).

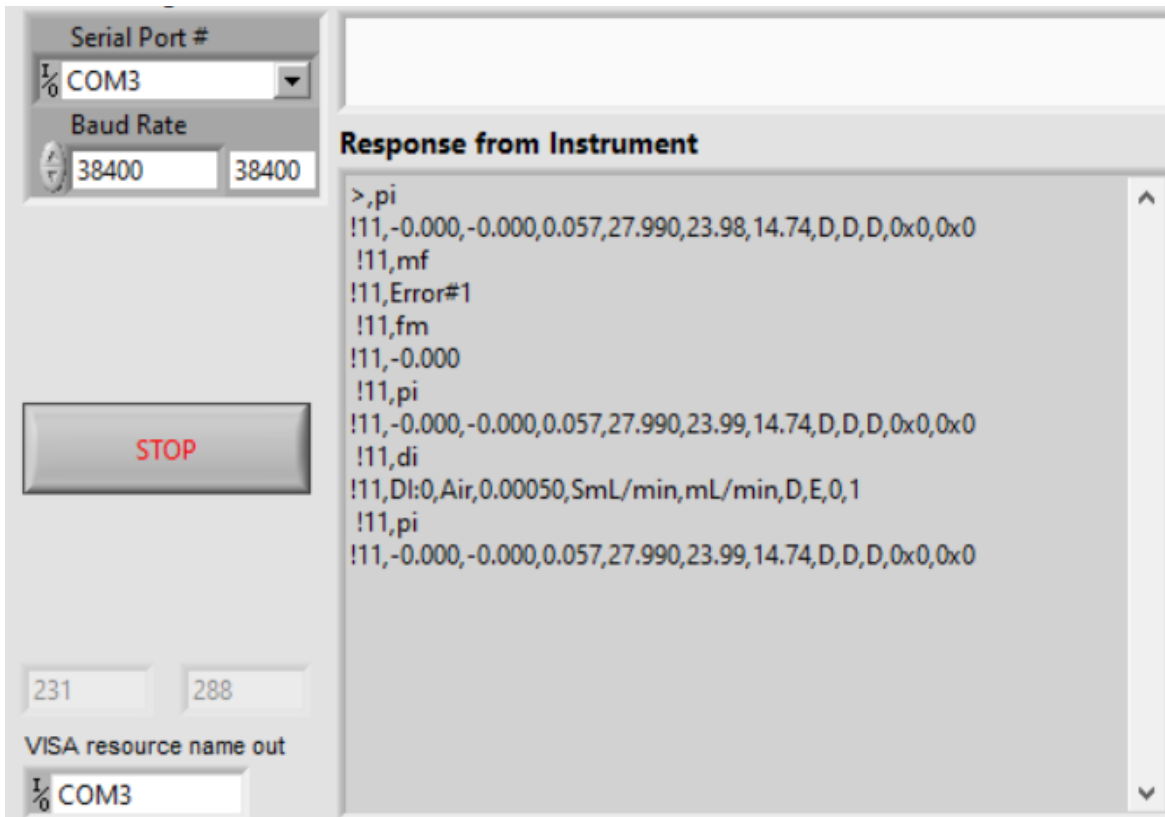
NOTE: This VI example does check set point value entered in currently selected mass flow engineering units on the subject of validity. Set point values which exceed 125% of instrument full scale flow are not processed.

WARNING: This VI example provides warning to the user when "*Valve Open*" mode is selected. Users must avoid instantaneous application of high differential pressure by switching solenoid valve to *OPEN* mode while differential pressure across upstream and downstream of the controller is more than 12 PSID (for *Breeze* model 9.75 PSID).

This example shows how to integrate more advanced DPM/DPC features in to the new program or in to the existing program.

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5.5 DPCM Simple Terminal Interface



This example VI is for communicating with AALBORG DPM and DPC instruments via serial communication interface using ASCII commands set (see instrument operating manual for complete list of supported commands). For RS485 interface the start character is always '!' and two characters of address with comma delimiter in the end must be submitted before each command (see example below, assuming instrument is configured for *RS-485* interface and Address is set to hexadecimal "11").

!11,PI

For the *RS-232* interface, the start character '!' and two hexadecimal characters for the address must be omitted. For all interfaces the command string is terminated with the equivalent of a carriage return; line feeds are automatically stripped out by the DPM/DPC instruments.

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5.6 DPCM Simple PI Read Driver Example

The screenshot displays the DPCM Simple PI Read Driver software interface. It features several key sections:

- Serial Configuration:** Shows RS-232 selected with an address of 11, COM3 as the serial port, a baud rate of 38400, and 8 data bits.
- Waveform Chart:** A graph showing a flat line at 0, representing the flow rate over time.
- Process Information:** Displays real-time data for Mass Flow (-0.000 SmL/min), Volumetric Flow (-0.000 mL/min), Totalizer #1 (0.057 SmL), Totalizer #2 (27.990 SmL), Gas Temperature (23.99 C), and Gas Pressure (14.74 PSIA).
- Device Information:** Shows details for the instrument, including Model Number (DPC17A-VAL6-A2), Serial Number (999001-2), Active Gas (0,Air), Full Scale Range (0.00050 sl/min), Mass EU (SmL/min), Volum. EU (mL/min), T1 (D), T2 (E), A Output (0-5Vdc), and Modbus (No).

It is simple example program which allow user to select interface type, instrument address (only applicable for *RS-485* interface), initialize COM port and continuously read instrument Process Information data. Once COM port is initialized the program reads instrument configuration information in to "*Device Information*" cluster and then it continuously reads PI data and displays the waveform chart for *Mass* and *Volumetric* flow rate.

NOTE: The *Interface Type* (RS-232 or RS-485), *RS-485 Address* and *COM port* parameters must be selected before start of the program. Changes made to these parameters during run time will not have any effect.

This example is a good starting point for creating ether new program or integrating DPM/DPC instruments in to the existing program.

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5.7 DPCM Simple PI Read Driver with Setpoint Example

The screenshot shows the DPCM Simple PI Read Driver software interface. It includes the following sections:

- Serial Configuration:** RS-485 RS485 Address (11), RS-232, Serial Port # (COM3), Baud Rate (38400).
- Setpoint:** 0.2500 SmL/min, Setpoint Source (Digital).
- Valve Mode:** Auto.
- Error Text:** Error Present (off).
- Received data:** !11,0.250,0.251,0.057,28.707,23.38,14.72.D.D.D.0x0.0x0
- Device Information:** Flow Controller, Model Number (DPC17A-VAL6-A2), Serial Number (999001-2), Selected Gas (0,Air), Full Scale Range (0.00050 sl/min), Mass EU (SmL/min), Volum. EU (mL/min), T1 (D), T2 (E), A Output (0-5Vdc), Modbus (No).
- Process Information:** Mass Flow (0.250 SmL/min), Volumetric Flow (0.251 mL/min), Totalizer #1 (0.057 SmL), Totalizer #2 (28.707 SmL), Gas Temperature (23.38 C), Gas Pressure (14.72 PSIA), FAlm (D), PAIm (D), TAlm (D), Alarm Events (0x0), Diagnostic Events (0x0).
- Waveform Chart:** Shows Mass Flow, Vol. Flow, and Setpoint over time. The Setpoint is a step function, and the flow rates follow it.
- Update Time [ms]:** 50.
- Measurements per second:** 20.0481.
- STOP PROGRAM** button.

It is simple example program which allow user to select interface type, instrument address (only applicable for RS-485 interface), initialize COM port, continuously read instrument Process Information data and write set point value to the DPC instruments. Once COM port is initialized the program reads instrument configuration information in to "*Device Information*" cluster and then it continuously reads PI data and displays the waveform chart for *Mass*, *Volumetric* flow rate and *Set Point* value. In addition to "*Read only simple VI example*" this program allows user to change "*Set Point Source*" parameter, "*Valve Mode*" parameter and "*Set Point*" value parameter during VI run time (these controls only enabled for DPC instruments).

NOTE: This VI example does not check set point value entered in currently selected mass flow engineering units on the subject of validity. User must make sure that set point value do not exceed 125% of instrument full scale flow.

WARNING: This VI example provides warning to the user when "Valve Open" mode is selected. Users must avoid instantaneous application of high differential pressure by switching solenoid valve to OPEN mode while differential pressure across upstream and downstream of the controller is more than 12 PSID (for Breeze model 9.75 PSID).

NOTE: The *Interface Type* (RS-232 or RS-485), *RS485 Address* and *COM port* parameters must be selected before start of the program. Changes made to these parameters during run time will not have any effect.

This example is a good starting point for creating ether new program or integrating DPM/DPC instruments in to the existing program.

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5.8 DPCM Simple Driver Example Multiple Devices with Setpoint

Device Address to Include: 1

Process Information

| | | |
|--------------|--------|---------|
| Set Point | 0.000 | SmL/min |
| Valve Counts | N/A | Counts |
| Mass Flow | -0.000 | SmL/min |
| Volum. Flow | -0.000 | mL/min |
| Totalizer #1 | 0.057 | SmL |
| Totalizer #2 | 27.990 | SmL |
| Gas Temp. | 23.95 | C |
| Gas Pressure | 14.75 | PSIA |

Flow Temp. Press.
Alarm D D D

Alarm Events 0x0 ●

Diagnostic Events 0x0 ●

Device Addresses have to to be selected before running software! Process Information is displayed only for selected device.

Active Device

11

Setpoint (for selected device)

0.000 SmL/min

Serial Configuration

RS485 Serial Port #

COM3

Baud Rate

38400 38400

In order to communicate with multiple devices, all DPC and DPM instruments connected to RS485 network must be configured for RS485 interface.

Read Valve Output

[Esc]

STOP PROGRAM

Device Information

| Device Function | Model Number | Serial Number | Selected Gas | Full Scale Range | Mass EU | Volum. EU | Temp. EU | Press. EU | A Output | Modbus |
|-----------------|----------------|---------------|--------------|------------------|---------|-----------|----------|-----------|----------|--------|
| Controller | DPC17A-VAL6-A2 | 999001-2 | 0,Air | 0.00050 sl/min | SmL/min | mL/min | C | PSIA | 0-5Vdc | No |

This simple example program initializing the COM port, determining the instruments configuration data for up to 45 DPM/DPC instruments, acquiring the data of the same number of instruments, displaying the data only for the one with the selected *Active Device* address. This example also allows to write a set point value to the instrument which address is selected in the "Active Device" control.

This example will work only for DPM/DPC instruments with digital communication interface configured for *RS-485* interface option.

When developing the program for multiple DPM/DPC instrument connected to the same single *RS-485 COM* port without the use of for loops with shift registers, ensure that each ASCII command is executed sequentially. Make sure each device connected to the *RS-485* network has unique address.

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