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ACTION INSTRUMENTS
...the Industrial I/O Company

WebView I/O Custom Protocol (WVCP)

Protocol Specification Document

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Eurotherm
44621 Guilford Dr. Suite 100
Ashburn, VA 20147

Phone: 703-724-7300
Fax: 703-724-7301
Email: info.eurotherm.us@schneider-electric.com
www.eurotherm.com

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1. Introduction

The WVC16 WebView I/O Communication Interface module includes a Java applet named WebView I/O Data Viewer that provides all of the functionality necessary to view and change information about the WVC16 and its associated process modules. A user need only have an Ethernet network set up and have the WVC16 configured for and connected to that network. The user may then use the web browser of choice (the browser must support Java Plug-in 1.4.1 or later) to interact with the WVC16 using the Data Viewer applet.

The Data Viewer applet communicates with the WVC16 using Eurotherm Action's WebView I/O Custom Protocol (WVCP), which is based on the Extensible Markup Language (XML).

The present document specifies the WVCP protocol. Using this document, a user can write a client application that connects to a WVC16 and manages the flow of information between the application and the WVC16. A familiarity with the WVC16, its operation, the Data Viewer applet, TCP sockets, and XML is assumed.

2. Protocol Overview

The WVCP protocol operates over the WVCP port, which has been defined by Eurotherm Action as TCP port 17604. Since the protocol is based on TCP/IP, no error checking or forward error correction is necessary at the application layer (WVCP client application).

All WVCP traffic must conform to the XML standard. This allows client applications to make use of standard XML parsers and tools. For instance, the Data Viewer applet uses the Simple API for XML parser (SAX).

2.1 WVCP Messages

All WVCP messages fall into one of these four categories:

- Greeting
- Commands
- Reply messages
- Data pump messages

The greeting is sent by the WVCP server running inside the WVC16 to the WVCP client when the client establishes the connection, and indicates the status of the WVCP server.

WVCP commands are sent by the WVCP client to the WVCP server.

Reply messages are sent by the WVCP server to the WVCP client as a reply to a WVCP command sent by the client.

Finally, data pump messages are sent by the WVCP server to the WVCP client at regular time intervals and contain regular real-time I/O measurement updates from the process modules connected to the WVC16.

3. Connecting to the WVCP Server

After initialization, the WVCP server waits for clients by listening to TCP port 17604. The WVCP client then establishes a TCP connection using the standard sockets interface. When the connection is established, the WVCP server sends back the following greeting:

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<WVCP version="2.0" irVersion="2.0" status="Ready">
```

The first element (*i.e.* first "line", although no CR/LF characters are used in WVCP) is the standard XML declaration. It defines the XML version (1.0) and the character encoding used, which is the standard ISO-8859-1 (Latin-1/West European) character set.

The second line opens the `<WVCP>` element within which all traffic takes place, and specifies the WVCP protocol revision used (2.0, as specified by this document), the infrared protocol revision used (2.0, for reference only), and the WVCP server status. The server status can be one of the values listed in the following table.

Status	Description
`Ready`	The WVCP server is ready to accept commands.
`Out of Client Connections`	The WVC16 only supports up to 4 WVCP client connections. All 4 connections are currently established. Close one or more connections and try again.
`Not Enough Memory`	Not enough system memory is available at this time to establish the connection. See "Not Enough Memory" error message in Section 11.9, System Errors, below.

Table 1—WVCP Server Status

When the status is `Out of Client Connections` or `Not Enough Memory`, the `version` and `irVersion` attributes are omitted from the `<WVCP>` tag, and the tag will be sent as an empty tag, as shown below.

```
<WVCP status="Out of Client Connections" />
```

```
<WVCP status="Not Enough Memory" />
```

The client should then close the socket. If the socket is still open 3 seconds after the server sent the `<WVCP>` tag, the WVCP server will close the socket.

If the status returned is `Ready`, the client can start sending WVCP commands. When disconnecting at the end of the session, the client must send the `Quit` command to the server. The server then logs the client out, replies to the `Quit` command, closes the `<WVCP>` element by sending the `</WVCP>` end tag, then closes the socket.

4. Authentication

Once the WVCP client has established a connection with the server and that the server is ready to accept commands (*i.e.* returned `Ready`), the client is then ready to log in using the `Login` command. There are two authentication levels on the WVCP server: ***user*** and ***admin***, described below.

4.1 User

The user account has read-only access to all information. It can read registers, I/O, view the address book and alarm settings. The user account also has the ability to start and stop data logging and to download and reset the data log.

The user account cannot change any settings whatsoever. These settings include process module calibration, setting the name on a process module or the WVC16, set ranges, change ranges, set alarms, add or remove names from the address book, set or change alarms.

A maximum of four clients may simultaneously log in using the user account. If the admin user logs in, all current user accounts are automatically logged out. This is done as a protection mechanism to prevent clients from using "stale" information (*i.e.* information modified by the admin). No user will be able to log in again until the admin account has logged out.

4.2 Admin

The admin account has the right to view data as well as make changes to settings. Only one client may log in as admin at a time. No other accounts, be it user or admin, may be logged in at the same time. No other accounts are permitted to log in until the admin account logs out.

5. Communicating With the WVCP Server

Once the WVCP client is logged in, it can start sending commands to the WVCP server. At the beginning of the session, the "data pump" is off. See Section 5.1, The Data Pump, below for a description of the data pump.

With the data pump off, the WVCP server acts as a true server: it abides by the rule "Do not speak unless spoken to" and waits for a command from the WVCP client before sending a reply. The WVCP server will reply to every command sent by the WVCP client.

5.1 The Data Pump

The data pump is a feature that lets the WVCP server send data pump messages to the WVCP client at regular time intervals. Data pump messages contain regular near real-time I/O measurement updates from the process modules connected to the WVC16. For a list of all possible data pump message types, see Section 10, Data Pump Messages, below. Each WVCP client has its own data pump control: one client can have the data pump on while another client can have the data pump off.

After the WVCP client turns on the data pump, the WVCP server starts sending the process module I/O data as often as data is available. In this case, data is sent asynchronously and without being requested by the client, *i.e.* "pushed" to the client.

Important: it is possible for a data pump message to be embedded within a message reply, and the WVCP client must be ready to handle this possibility. Note that all replies remain valid XML is all cases, so that a data pump message never appears within an XML tag, but always between XML subelements.

6. Managing Process Modules

The WVCP client is responsible for managing the process modules attached to the WVC16 and correctly presenting them to the user. To that end, the WVCP client must keep track of the following information:

- The WV bus configuration, *i.e.* the list of process modules currently connected to the WVC16, as well as the addition and removal of process modules on the fly (plug-and-play).

- The properties of each process module, such as the number of inputs and outputs, the type of output (analog, relay, etc.), the number of selectable ranges, etc. This is referred to as the Static Information, or Static Info, and can be obtained for each process module type using the `GetStaticInfo` command.

- Optionally, the current configuration of each module, such as the currently selected range, etc. If the WVCP client does not keep track of this information, it will have to ask the process module again every time the information is needed, resulting in decreased performance. Note that because only one admin is allowed to log in at a time, it is safe for WVCP clients to internally cache the current configuration for each module.

The best way for the WVCP client to keep track of the bus configuration in near real-time is to turn on and monitor the data pump. Each module on the bus receives a unique **module address**, a number between 1 and 32. This number should be invisible to the user (the user refers to process modules by their name). When receiving a data pump message for a module address not currently in the client database, get the new module's model and version number (`GetModel` command), the module configuration (module name, etc.), and store the data in the module database. In addition, after getting the model and version number, verify that the Static Info for the new module is already known, otherwise get it and store it in the static info database.

When a process module is removed from the bus, the WVCP client receives a `Remove` data pump message. The WVCP client must then remove the corresponding process module entry from the process module database.

Note that the `GetModList` command can also be used to get an instantaneous list of process module addresses currently on the bus, however one must keep in mind that the bus configuration may be changing as the module list gets sent back to the WVCP client.

6.1 Pseudo-Code

The pseudo-code below is provided as a guide to outline the general structure of a general purpose WVCP client.

```
procedure WVCPClientTask

   declare static info database  // (see GetStaticInfo)

   declare module database [32 entries]
      - module configuration (name, selected ranges, etc.)
      - pointer to static info database entry

   open socket connection
   confirm WVCP server ready
   log in as either user or admin
   start the data pump

   repeat

      if user wants to talk to WVC16:
         send command
         wait for reply message
         process reply message

      if IO Data Pump received:
         ProcessIODataPump  // (see below)

      if Remove Data Pump received:
         remove corresponding module from module database

   until user wants to quit OR AdminLoggedOn Data Pump received

   stop the data pump
   log out
   confirm logout  // (check "Quit" reply message)
   confirm WVCP element closed
   confirm socket connection closed

end WVCPClientTask.



procedure ProcessIODataPump

   identify module address

   if module not present in module database:
      // A new module just got added to the rail.
      get new module's model and version (GetModel command)
      add module to module database

      if static info for model/version not in static info database:
         // The new module is of unknown model/version.
         get static info for model/version (GetStaticInfo command)
         store new static info entry in static info database

      set module entry to point to static info database entry

   update the user with the new I/O values

end ProcessIODataPump.
```

7. WVCP Syntax

7.1 WVCP Command Syntax

WVCP commands, sent by the WVCP client to the WVCP server, must be sent as a single XML ***empty tag***, with or without attributes.

Example of a WVCP command without attributes:

```
<StartPump />
```

Example of a WVCP command with attributes:

```
<GetRange address="10" rangeType="I" />
```

The empty tag construct must be used. The equivalent XML construct:

```
<GetRange address="10" rangeType="I"></GetRange>  Error!
```

is not a valid WVCP command and will result in an error condition.

Note: The WVCP client does not need to conform to any particular attribute order and can arrange the order of attributes in any desired way.

7.2 WVCP Reply Syntax

All replies from the WVCP server are contained within a `<Reply>` element. The `<Reply>` tag contains a `cmd` attribute with the name of the WVCP command being replied to, and a `status` attribute, which can be either `Ok`, `Error`, or `Syntax Error`. When the reply status is `Syntax Error`, no `cmd` attribute is specified. The `<Reply>` tag will contain more attributes when the reply status is `Error` or `Syntax Error`. See Section 11, Error Messages, below for more details and error reply examples.

The `<Reply>` element may include information contained in subelements, or may be an empty tag.

Example of an empty tag WVCP reply:

```
<Reply cmd="StartPump" status="Ok" />
```

Example of a WVCP reply with subelements:

```
<Reply cmd="GetLogStat" status="Ok">
  <Status>ON</Status>
  <Interval>3600</Interval>
  <LoggingTime>
    <H>23</H>
    <M>59</M>
    <S>59</S>
  </LoggingTime>
  <LogModList>
    <Module address="8" />
    <Module address="17" />
  </LogModList>
</Reply>
```

8. WVCP Commands

Following is the complete list of all supported WVCP commands. Each command includes the following information:

- Description
- Availability: defines which user has the privilege of invoking the command.
- Command Attributes: a list of attributes to include to the WVCP command.
- Reply Elements and Attributes: a hierarchical list of subelements the WVCP server includes in the reply. Each subelement may include one or more attributes, in which case the attribute names will be listed in parentheses following the subelement name. Compare the reply elements for command `GetLogStat` below with the example shown in Section 7.2, WVCP Reply Syntax, above.

The data type of elements and attributes are included in the description of the command. The most common data types are listed in the table below.

Attribute	Data Type and Description
`address`	A number from 1 to 32. Specifies a process module address.
`addrIndex`	A number from 1 to 10. Specifies the index of an email address inside the address book.
`ioIndex`	A number larger than or equal to 1, typically either 1 or 2. On process modules with multiple inputs and/or outputs, specifies the input number ("channel") or the output number respectively. For example, on process modules with 2 output relays, this attribute is used to specify one of the two relays.
`password`	A character string from 0 to 10 valid ISO-8859-1 characters. Specifies a password. Passwords are case sensitive.
`rangeType`	A single character. Must be either I, O, or S. Specifies a range type as input, output, or special respectively.
`register`	A character string from 1 to 6 uppercase letters. Specifies one of the WVCP registers listed in Section 9, WVCP Register List, below.
`userName`	A character string. Specifies the user name. Can be either `user` or `admin`.

Table 2—Common Attribute Data Types

AutoSense

Description

Instructs a process module to sense the input signal level and automatically adjust the input gain. Can only be processed by modules that support the auto-sense feature, such as frequency input modules (WV478). Sending this command to modules that do not support the auto-sense feature will result in an error condition. The `CanAutoSense` element inside the analog input element of the static info (see `GetStaticInfo`) indicates whether the module supports the auto-sense feature.

Note: in the Data Viewer applet, this feature is referred to as ***Auto Level***.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- address

Reply Elements and Attributes

None

Cal

Description

Calibrates a process module. Functions the same way as `SetRegData` below, but instead of setting a register to a given scale and count, this command sets the register to whatever value is physically present at the process module's input terminals.

Note that not all WVCP registers are calibratable. In the WVCP register list (see Section 9, WVCP Register List), only those registers with Cal listed on the Access line are calibratable. Attempting to calibrate a non-calibratable register will result in an error condition.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- register
- register's Command Attributes [see register list]

Reply Elements and Attributes

None

CalTemp

Description

Calibrates the internal temperature sensor on the process module. The temperature is specified in tenths of a degree. The range of valid numbers are from 0 to 600 where 0 represents 0.0 °C and 600 represents 60.0 °C.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- address
- temperature

Reply Elements and Attributes

None

DelAdrBk

Description

Deletes an email address entry from the address book. This is only necessary when deleting an old address that will not be replaced with a newer one. If replacing an old address entry with a newer one, use the `SetAdrBk` command. It automatically deletes the old entry.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- addrIndex

Reply Elements and Attributes

- AccountName [optional; omitted if entry already blank]

Echoh

Description

This command is intended for performing diagnostics and troubleshooting. Use only as directed by Action Instruments' technical support.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- hexData

Reply Elements and Attributes

- HexData

FlashLED

Description

Instructs a process module to flash its front panel LEDs at 8 Hz for 10 seconds. Used to identify a process module on a rail.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

- address

Reply Elements and Attributes

None

GetAdrBk

Description

Gets the contents of the email address book. If an `addrIndex` value is given, gets only the corresponding email address book entry. Each address book entry consists of an account name and an email address.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

- addrIndex [optional; if not specified, returns the entire address book]

Reply Elements and Attributes

- Entry (addrIndex) [always 10 entries]
  - AccountName [optional]
  - EmailAddress [optional]

GetDateTime

Description

Gets the system time. All elements, including the month, are returned as numerical values.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

- Date
  - Y
  - M
  - D
- Time
  - H
  - M
  - S

GetEmailStatus

Description

Gets the email alerter status, either `Enabled` or `Disabled`.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

- Status ["Enabled" or "Disabled"]

GetLog

Description

Gets the logged data. It takes approximately 2 minutes to send the log buffer when it is full. If the WVCP server does not specify the `i` attribute, the client should assume an input index value of 1.

Important: The bus configuration (number, types, and position of process modules on the bus) must remain unchanged for this command to work correctly.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

- LogData [zero or more]
  - P (ad, i) [ad = module address; i = input index (optional, default = 1)]
    - T [time stamp in YYYYMMDD HHMMSS format]
    - V [value]

GetLogStat

Description

Gets the log status and associated parameters. The status is either `ON` or `OFF`. The interval is a numerical value in seconds. The logging time is returned as hours, minutes, seconds. The `LogModList` subelement lists the address of all modules currently enabled for logging. For an example of reply for this command, see Section 7.2, WVCP Reply Syntax, above.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

- Status
- Interval
- LoggingTime
  - H
  - M
  - S
- LogModList
  - Module (address) [zero or more]

GetModel

Description

Gets the model name and firmware version code of the WVC16 or a process module.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

- address [optional; no address means WVC16]

Reply Elements and Attributes

- Model
- Version

GetModList

Description

Gets the list of addresses of process modules currently connected to the WVC16.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

- Module (address) [zero or more]

GetName

Description

Gets the module name of the WVC16 or a process module.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

- address [optional; no address means WVC16]

Reply Elements and Attributes

- Name

GetRange

Description

Gets the currently selected range for a given process module and range type. The range type can be either `I` for Input, `O` for Output, or `S` for Special. The currently selected range is returned as a range index (numerical value) which indexes into the range list given by the `GetStaticInfo` command.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

- address
- rangeType [I, O, or S]

Reply Elements and Attributes

- RangeIndex (typeIndex) [zero or more]

GetRegData

Description

Gets the current value of a WVCP register. The WVCP registers are listed in Section 9, WVCP Register List, below. The reply type varies by register.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

- register
- register's Command Attributes [see register list]

Reply Elements and Attributes

- register's Reply Elements [see register list]

GetSMTPSender

Description

Gets the SMTP sender email address. The SMTP sender email address is used in the "From" field of outgoing email messages.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

- EmailAddress

GetSMTPServer

Description

Gets the IP address of the SMTP server used to send email alert messages.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

- IP

GetStaticInfo

Description

Gets the static (non-changing) information associated with a given process module type and version in a structured format.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

- address

Reply Elements and Attributes

- Inputs
  - Analog (inputIndex) [one or more]
    - CanAutoSense
    - Range (rangeIndex) [one or more]
      - Name
      - High
      - Low
      - Exponent
      - Unit
      - Cal [optional]
        - Name
        - HighCalPt
        - LowCalPt
    - Special (spclIndex) [zero or more]
      - [same as < Special > under <Specials> below]
- Outputs
  - Analog (outputIndex) [zero or more]
    - Range (rangeIndex) [one or more]
      - [same as <Range> under <Inputs> above]
    - Special (spclIndex) [zero or more]
      - [same as < Special > under <Specials> below]
  - ConventionalRelay (outputIndex) [zero or more]
    - Special (spclIndex) [zero or more]
      - [same as < Special > under <Specials> below]
  - LatchingRelay (outputIndex) [zero or more]
    - Mode
      - Range (rangeIndex) [one or more]
        - Name
    - Special (spclIndex) [zero or more]
      - [same as < Special > under <Specials> below]
- Specials
  - Special (spclIndex) [zero or more]
    - Name
    - Range (rangeIndex) [one or more]
      - Name

GetUserValue

Description

Gets one of the user values. User values are stored in the WVC16's non-volatile memory (EEPROM), but do not affect the WVC16's operation. The user values are intended to save custom configuration settings for WVCP clients.

There are 100 user values available, each 16 bits in length. The allowable range for the index attribute is 0 to 99. The allowable range for the value is -32,768 to 32,767.

The WebView I/O Data Viewer (version 2.0) uses User Value index 0 to store the "View As °F" user setting. Use of User Value index 0 by other WVCP clients is not recommended.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

- index

Reply Elements and Attributes

- Value

Login

Description

Logs the user in. See Section 4, Authentication, above for details.

Availability

Admin	
User	
Not logged in	✓

Command Attributes

- userName
- password

Reply Elements and Attributes

None

Ping

Description

"Pings" the WVCP server at the application level. Used to verify that the server is still present and that the server connection is still intact.

Availability

Admin	✓
User	✓
Not logged in	✓

Command Attributes

None

Reply Elements and Attributes

None

Quit

Description

Logs the user out and terminates the session. The server will close the socket connection.

Availability

Admin	✓
User	✓
Not logged in	✓

Command Attributes

None

Reply Elements and Attributes

None

Reboot

Description

Reboots the WVC16 after a 3 second delay. Equivalent to physically pressing the Reset button on the front panel.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

None

Reply Elements and Attributes

None

ResetLog

Description

Resets the data log. All data inside the data log is cleared. The log status, the logging interval, and the list of process modules enabled for logging remain unchanged.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

None

ResetMinMaxTemp

Description

Resets the minimum and maximum recorded temperatures on a process module. The minimum and maximum temperatures are set to the process module's current ambient temperature.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- address

Reply Elements and Attributes

None

SetAdrBk

Description

Sets one of the email address entries in the address book to the given account name and email address. Account names must be between 1 and 35 characters in length. Email addresses must be between 1 and 64 characters in length. The WVCP server does not validate the syntax of email address strings.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- addrIndex
- accountName
- emailAddress

Reply Elements and Attributes

None

SetDateTime

Description

Sets the system time. All elements, including the month, must be specified as numerical values. The year must be included between 2001 and 2068 inclusively.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- year
- month
- day
- hour
- minute
- second

Reply Elements and Attributes

None

SetEmailStatus

Description

Sets the email alerter status. Must be either `Enabled` or `Disabled`. When disabled, no email alert messages will be issued.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- status ["Enabled" or "Disabled"]

Reply Elements and Attributes

None

SetLogStat

Description

Sets the log status and associated parameters. The status must be either `ON` or `OFF`. The `addresses` attribute must specify the list of process module addresses to enable for logging, separated by commas, for example `addresses="1,2,6,27"`. The interval must be specified as a numerical value, in seconds, between 1 and 65,535.

This command returns the resulting logging time, in hours, minutes, seconds.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- addresses
- interval

Reply Elements and Attributes

- LoggingTime
  - H
  - M
  - S

SetName

Description

Sets the module name of the WVC16 or a process module. Module names must be between 0 and 16 characters in length

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- address [optional]
- name

Reply Elements and Attributes

None

SetPass

Description

Sets the password of the user account specified in the `userName` attribute (either `user` or `admin`). See Table 2—Common Attribute Data Types above for the attribute data types.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- userName
- password

Reply Elements and Attributes

None

SetRange

Description

Selects a range on a given process module and range type. The range type can be either `I` for Input, `O` for Output, or `S` for Special. The range type index is an integer value specifying which input, output, or special the selected range should apply. For example, on a dual latching relay output module, `rangeTypeIndex` will be either 1 or 2 and will specify to which relay to apply the selected range. Finally, the range index specifies which range to select and is an integer value which indexes into the range list given by the `GetStaticInfo` command.

This command returns the selected range name as a string (for example `±25 mA`), and can be used by the client to confirm that the correct range has been selected.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- address
- rangeType
- rangeTypeIndex
- rangeIndex

Reply Elements and Attributes

- RangeName

SetRegData

Description

Sets the value of a WVCP register. The WVCP registers are listed in Section 9, WVCP Register List, below.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- register
- register's Command Attributes ***and*** Set Attributes [see register list]

Reply Elements and Attributes

None

SetSMTPSender

Description

Sets the SMTP sender email address. The SMTP sender email address is used in the "From" field of outgoing email messages, and must be between 0 and 64 characters in length. The WVCP server does not validate the syntax of email address strings.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- emailAddress

Reply Elements and Attributes

None

SetSMTPServer

Description

Sets the IP address of the SMTP server used to send email alert messages. The IP address string specified must be a valid IP address format, for example: `ip="192.168.1.64"`. An invalid IP address format will result in an error condition.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- ip

Reply Elements and Attributes

None

SetUserValue

Description

Sets one of the user values. See `GetUserValue` for details.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

- index
- value

Reply Elements and Attributes

None

StartLog

Description

Starts logging process module data. The data is logged until the `StopLog` command is executed or the WVC16 is reset. When the data log buffer fills up, the newest data sample overwrites the oldest one.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

None

StartPump

Description

Starts the data pump. See Section 5.1, The Data Pump, above for more information.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

None

StopLog

Description

Stops logging process module data. See `StartLog` for details.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

None

StopPump

Description

Stops the data pump. See `StartPump` for details.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

None

TestEmail

Description

Sends a test email message to all recipients in the address book. Used to test the setup of the STMP server and its parameters.

Availability

Admin	✓
User	
Not logged in	

Command Attributes

None

Reply Elements and Attributes

None

WhoAmI

Description

Gets the login name for the current user.

Availability

Admin	✓
User	✓
Not logged in	

Command Attributes

None

Reply Elements and Attributes

- UserName

9. WVCP Register List

Following is the complete list of all supported WVCP registers.

ALRTLO

Alert Low

Access:	Get and Set
Command Attributes:	address, inputIndex
Set Attributes:	status, scale[1], count
Reply Elements:	Status, Scale[2], Count

ALRTHI

Alert High

Access:	Get and Set
Command Attributes:	address, inputIndex
Set Attributes:	status, scale[1], count
Reply Elements:	Status, Scale[2], Count

CAT

Current Ambient Temperature

Access:	Get Only
Command Attributes:	address
Reply Elements:	Temperature

CRCERR

CRC Error Count

Access:	Get Only
Command Attributes:	address
Reply Elements:	Count

FSHI

Full Scale High Input

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

FSHO

Full Scale High Output

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

FSLI

Full Scale Low Input

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

FSLO

Full Scale Low Output

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

I

Input

Access:	Get Only
Command Attributes:	address, ioIndex
Reply Elements:	EngValue

MAXT

Maximum Recorded Ambient Temperature

Access:	Get Only
Command Attributes:	address
Reply Elements:	Temperature

MINT

Minimum Recorded Ambient Temperature

Access:	Get Only
Command Attributes:	address
Reply Elements:	Temperature

O

Output

Access:	Get and Set
Command Attributes:	address, ioIndex
Set Attributes:	count
Reply Elements:	EngValue

OPHI

Operational High Input

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

OPHO

Operational High Output

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

OPLI

Operational Low Input

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

OPLO

Operational Low Output

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

RCS

Remote Calibration Switch

Access:	Get Only	
Command Attributes:	address	
Reply Elements:	SwitchState	["Enabled" or "Disabled"]

RP

Resetpoint

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

RT

Run Time

Access:	Get Only
Command Attributes:	address
Reply Elements:	Count

SP

Setpoint

Access:	Get, Set, and Cal
Command Attributes:	address, ioIndex
Set Attributes:	scale[1], count
Reply Elements:	Scale[2], Count

TMR

Timer (Administrative Alert)

Access:	Get and Set
Command Attributes:	address
Set Attributes:	status, interval
Reply Elements:	Status, RemainingTime

Note 1: The `scale` attribute is optional. When not present, a scale value of 0 is assumed.

Note 2: The `<Scale>` element is optional. When not present, a scale value of 0 must be assumed.

9.1 Scaling

Some WVCP registers have a scaling value in addition to their count value. Count values are signed 16 bit integers and can thus assume any integer value between –65,536 and +65,535. Scaling values are used to improve the resolution of a count. The register value is defined as its count halved the number of times specified by the scaling value. Stated in a different way:

$$v = \frac{c}{2^s}$$

where: v is the internal register value
c is the register count
s is the register scale

Whenever the scale is omitted, it is considered to be zero, therefore the internal register value equals the register count. The scaling value is a signed 8 bit integer with legal values between –128 and +127.

10. Data Pump Messages

Following is the complete list of all supported WVCP data pump messages. The hierarchical list of subelements follows the same format as the WVCP commands in Section 8, WVCP Commands, above. Full XML examples are also provided. For more information on the data pump feature, see Section 5.1, The Data Pump, above.

AdminLoggedOn

Admin User Logs On

- Pump (type)

Example

```
<Pump type="AdminLoggedOn" />
```

IO

I/O Data Update

- Pump (type, address)
  - Input (ioIndex) [one or more]
  - Output (ioIndex) [one or more]
  - Flag [optional]

Note

The <Flag> element is only present when one or more input or output is out of range. The possible values are as follows:

- FSHI ..... Full Scale High Input
- FSLI ..... Full Scale Low Input
- OPHI ..... Operational High Input
- OPLI ..... Operational Low Input
- FSHO ..... Full Scale High Output
- FSLO ..... Full Scale Low Output
- OPHO ..... Operational High Output
- OPLO ..... Operational Low Output

A Full Scale High or Low condition implies that the corresponding Operational High or Low also exists. Input flags override output flags: when both an input and an output are out of range, only the input condition flag will be present.

Example

```
<Pump type="IO" address="1">
   <Input  ioIndex="1">12345</Input>
   <Output ioIndex="1">32715</Output>
   <Output ioIndex="2">14373</Output>
   <Flag>OPHI</Flag>
</Pump>
```

Remove

Process Module Removed

- Pump (type, address)

Example

```
<Pump type="Remove" address="14" />
```

11. Error Messages

Following is the complete list of WVCP error messages. The status attribute is `Syntax Error` for XML syntax errors (see Section 11.1 below) and `Error` for all other errors. XML syntax errors do not include a `cmd` attribute. When an attribute name in brackets follows the error message, it means that the specified attribute accompanies the reply to designate the location of the error (character position or attribute name).

Examples:

```
<Reply status="Syntax Error" errMsg="Invalid character" pos="17" />

<Reply status="Error" cmd="GetVer" errMsg="Invalid command name" />

<Reply status="Error" cmd="Login" errMsg="Login failed" />

<Reply status="Error" cmd="GetModel" attr="address" errMsg="Invalid attribute value" />

<Reply status="Error" cmd="GetModel" errMsg="Process module address is vacant" addr="29" />
```

11.1 XML Syntax Errors

Invalid character [pos]

The XML element sent contains an invalid or unexpected character.

Equal sign ('=') expected [pos]

An equal sign is expected at the specified position.

Quoted attribute value expected [pos]

The start of an attribute value between quotes (") or apostrophes (') is expected at the specified position.

End of element ('>') expected [pos]

A "larger than" sign is expected at the specified position to specify the end of the XML element.

Invalid predefined entity [pos]

One of the attribute value strings contains an invalid predefined XML entity. At this time, the only valid predefined XML entities are: & < > ' and ".

Attribute buffer overflow

The size of the combined attribute values in the command sent is too large for the storage space designed to hold the attribute values. Resend the command with shorter attribute values.

11.2 Command Errors

Invalid command name

The command name is not recognized. Send a valid command.

11.3 Attribute Errors

Attribute not found [attr]

One of the attributes required for this command was not found. Resend the command with the required attribute.

Invalid attribute name [attr]

One of the attribute names is not recognized. Resend the command with valid attribute names.

Duplicated attribute name [attr]

One of the attribute names is specified two or more times. Resend the command with each attribute specified only once.

Invalid attribute value [attr]

The value of one of the attributes is not valid. For example, this error would occur when a text string is given to an attribute expecting a number or a single character. Correct the attribute value.

Numerical value out of range [attr]

The number given to one of the attributes is either larger than the largest allowable number or smaller than the smallest allowable number for this attribute. Bring the number within the range of allowable values.

Attribute value too long [attr]

One of the attribute values exceeds the maximum allowable length for that attribute. For example, the longest name allowed on a module is currently 16 characters. Attempting to set a name of more than 16 characters would cause this error to occur.

11.4 Login Errors

Login failed

The userName and/or password attribute values of the `Login` command are invalid. Resend the `Login` command with correct `userName` and `password` values.

Not logged in

The requested command requires the user to log in. Log in and resend the command.

Already logged in

This error occurs when the user attempts to log in when already logged in.

Cannot log in; Admin is logged in and has exclusive access

This error occurs when the user attempts to log in as Admin when another user is already logged as Admin. Only one Admin user can be logged in at a time. Wait for the Admin user to log out, then log in.

Permission denied

The requested command requires the user to have the required privilege (*e.g.* Admin). Log out, then log in with the required privilege (Admin) and resend the command.

11.5 Register Errors

Register not settable

The specified WVCP register is not settable and therefore cannot be used with the `SetRegData` command.

Register not calibratable

The specified WVCP register is not settable and therefore cannot be used with the `Cal` command.

11.6 Email Errors

No email recipient

This message occurs when the alarm manager attempts to send an email but there are no recipients in the email address book. Add one or more email recipients to the email address book and try again.

Test email failure

An error occurred when the WVC16 attempted to send a test email message as requested by the `TestEmail` command. The system could have run out of the necessary internal resources to complete the request, or an unspecified error may have occurred. Resend the command, or reboot the WVC16 and try again. Contact the factory if the problem persists.

SMTP send failure

An error occurred when attempting to communicate with the SMTP server to send a test email message. Verify that an SMTP server is available at the specified IP address and try again.

11.7 General Errors

Process module address is vacant [addr]

The requested module address is in the valid range of module addresses but no process module present on the infrared bus has that module address. This error is always associated with the command's `address` attribute (`addresses` for the `SetLogStat` command). The reply's `addr` attribute specifies the vacant module address. Specify the address of an existing module.

Remote calibration disabled

The requested range value cannot be modified when the process module's Remote Calibration Switch (RCS) is in the OFF position. Move the Remote Calibration Switch to the ON position and try again.

11.8 Process Module Communication Errors

Negative acknowledgement

The process module denied the WVC16's request for unspecified reasons.

Unexpected response from process module

This message occurs when the WVC16 sends a request to a process module and the module's response is different from what the WVC16 was expecting.

Process module communications error

The process module's responses to the WVC16's request repeatedly contain communication errors such as message length error, framing error, or CRC error.

Process module response timeout

The process module did not respond to the WVC16's request in the amount of time allotted.

11.9 System Errors

Socket send failure

The WVC16 was unable to send some data over the TCP socket. If the problem persists, disconnect and re-connect the client, or reboot the WVC16 and try again.

Not enough memory

Not enough system memory is available at this time to process the command. Resend the command, or re-boot the WVC16 and try again. Contact the factory if the problem persists.

Unknown error

The system could not determine the cause of the error. It may indicate a hardware fault. If this error can be replicated, please contact the factory for assistance and to report this condition.