SIEMENS

SIMATIC HMI

WinCC Unified
WinCC Unified Open Pipe

Operating Manual

Online documentation

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Online documentation

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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Note the following:

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

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Welcome to WinCC Unified Open Pipe

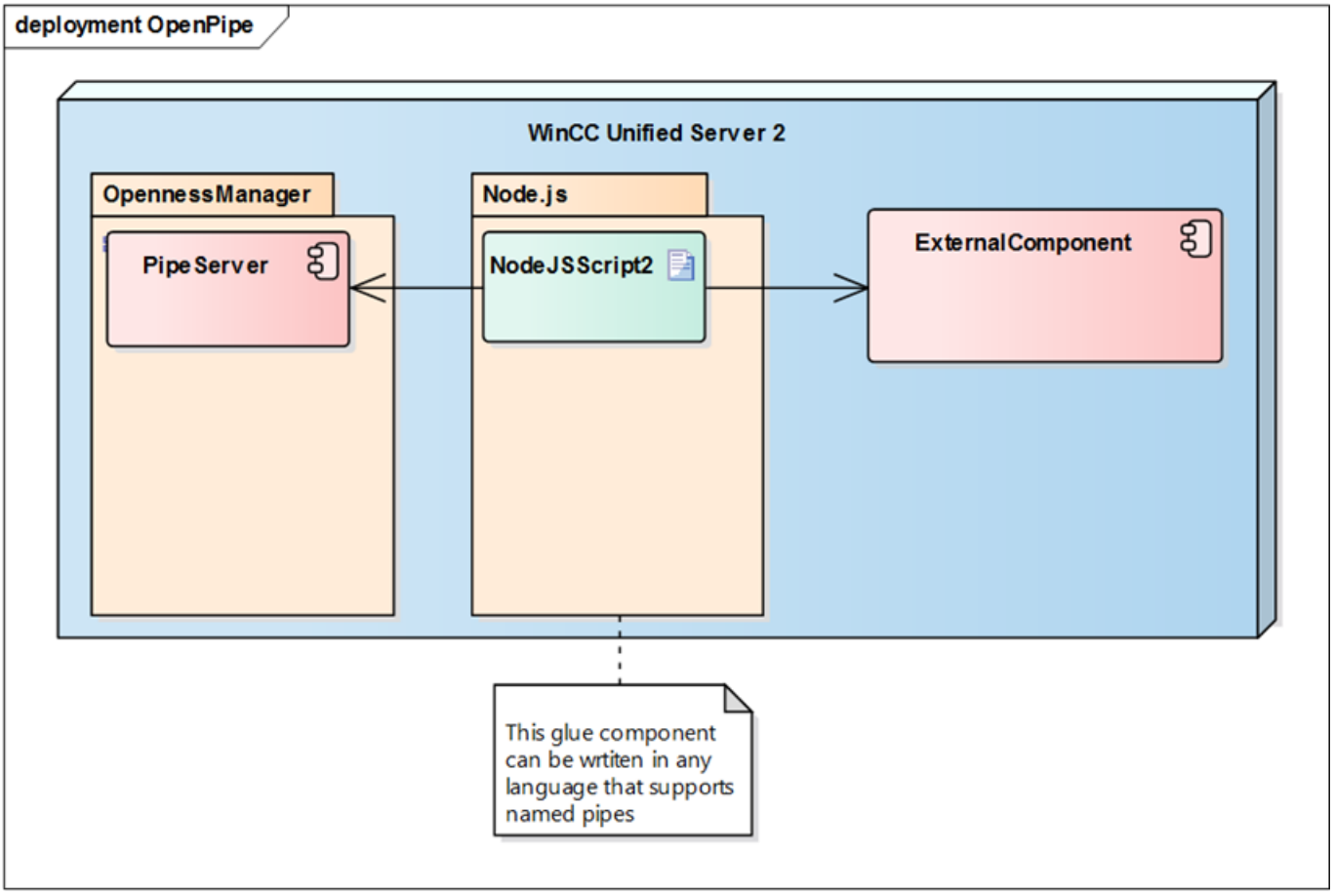
WinCC Unified Open Pipe is an Openness concept based on pipe technology to connect a customer application to WinCC Unified RT.

Compared to Openness RT (ODK), WinCC Unified Open Pipe offers a limited number of functions. However, the connection code can be written in any programming language that supports pipe technology. Even batch access to the pipe is possible.

The main aim of WinCC Unified Open Pipe is to make it possible for you to connect an existing application to WinCC Unified RT with little workload and independent of the programming language. The available commands let you communicate with WinCC Unified RT using tags and alarms.

Pipe technology

The pipe is a data stream with buffer between two processes that works according to the FIFO principle (First In First Out). One process is provided by WinCC Unified RT (OpennessManager). It creates the pipe and processes the requests of the customer application. The second process is the customer application. It connects to the pipe by using its name, sends requests and receives responses.



Name of the pipe:

- Under Windows: "\\.\pipe\HmiRuntime"
- Under Linux: "/tmp/HmiRuntime"

As soon as the pipe is open, single-line commands can be sent; they must end in a line break ("\n" or "\r\n"). Responses are returned using the same pipe instance.

Basic syntax and expert syntax

Two types of syntax are available for WinCC Unified Open Pipe:

- Basic syntax
  You use the basic syntax when you are working with basic batch files (e.g. in a CMD.exe or batch).
- Expert syntax
  You use the expert syntax when you are working with scripts or programming languages that have a JSON parser, e.g. Python, Node.js or Powershell.

Samples

You will find the following file on the installation medium:
"Support\Openness\Siemens.Unified.Openness_SDK_<version number>.zip"

Extract the file locally to any directory on your computer. You will then find examples of the use of WinCC Unified Open Pipe in the subfolder "OpenPipe\Samples".

Safety-related settings

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Pipe access

- The use of Open Pipe is limited to local communication between the Open Pipe application and Runtime.
- To access the pipe, the user of the client script must belong to the following user group:
  - Under Windows: "SIMATIC HMI"
  - Under Linux: "industrial"

Behavior of the browse commands

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Browse behavior

WinCC Unified Open Pipe provides several Browse commands in the simple syntax and in the expert syntax. The following behavior is common to all commands:

- Initial request
  In an initial request, you define the request using optional parameters.
- Page size
  To get the result faster, you can use a parameter to specify a page size in the initial request. If the result exceeds the specified page size, the response is distributed over several pages. Without this parameter the configured page size is used. You can read the configured page size via the commands "ReadConfig" and set it via "WriteConfig".
- Next request
  You get the next results page via the following requests. Next requests only have the parameter "Next".
- A Browse command is complete when a Next request returns an empty response.
- A Browse command that has not yet reached the last page of results is canceled in the following cases:
  - When the configured time limit for inactivity is exceeded.
    You can read the time limit via the commands ReadConfig and set it via WriteConfig.
  - When a new browse request is started.

Configurable settings

The following settings control the browse behavior:

Setting	Default value	Value range	Description
DefaultPageSize	1000	0 ... Uint32_Max	If a browse request was called without the PageSize parameter and the number of hits is greater than the value of DefaultPageSize, the response is distributed over several pages. Value 0: No pagination
BrowseTimeOut	300 s	0 ... Uint32_Max	For requests with pagination, defines after how many seconds without activity the request is canceled. After that a Next request returns an error. Value 0: No timeout

With the command "ReadConfig" you request the settings, with the command "WriteConfig" you set them. Changes apply to the current pipe session.

Using basic syntax

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4.1 Basics of basic syntax

Characteristics

The basic syntax has the following characteristics:

- Simple text-based syntax without JSON parts.
- Only commands for individual objects, e.g. write access to a single tag.
- Object names may not include special characters or space characters.
- No cookies.

Structure of a request

```
<Command> <Object> <Value>
```

- `Command`: Command name, e.g. "WriteTagValue"
- `Object`: Name of the object for which the command is called, e.g. "Tag1"
- `Value`: Input value, e.g. "True"

Structure of a response

OnSuccess:

```
Notify<Command> <Object> <Value1…ValueN>
```

- `Command`: Command name, e.g. "ReadTagValue"
- `Object`: Name of the object for which the command was called, e.g. "Tag1"
- `Value1...ValueN`: For example, value and quality of the read tags

OnError:

```
Error<Command> <Object> <Error text>
```

- `Command`: Command name, e.g. "ReadTagValue"
- `Object`: Name of the object for which the command was called, e.g. "Tag1"
- `Error text`: Detailed error description

Overview of the commands of the simple syntax

Command	OnSuccess	OnError	Description
`SubscribeTagValue <Tag>`	`NotifySubscribeTagValue <Tag> <Quality> <Value>`	`ErrorSubscribeTagValue <Tag> <Error text>` `ErrorNotifyTagValue <Tag> <Error text>`	Subscribe tag for monitoring. `Quality`={good, bad, uncertain}
`UnsubscribeTagValue <Tag>`	`NotifyUnsubscribeTagValue <Tag>`	`ErrorUnsubscribeTagValue <Tag> <Error text>`	Unsubscribe tag from monitoring.
`ReadTagValue <Tag>`	`NotifyReadTagValue <Tag> <Quality> <Value>`	`ErrorReadTagValue <Tag> <Error text>`	Reads the value of the tags from the system.
`WriteTagValue <Tag> <Value>`	`NotifyWriteTagValue <Tag>`	`ErrorWriteTagValue <Tag> <Error text>`	Writes the value to the tag.
`SetCharSet <Value>`	`NotifySetCharSet <Value>`	`ErrorSetCharSet <Value> <Error text>`	Changes to a different character coding.
`ReadConfig <Parameter>`	`NotifyReadConfig <Parameter> <Value>`	`ErrorReadConfig <Error text>`	Reads a setting configured for the general browse behavior.
`WriteConfig <Parameter>`	`NotifyWriteConfig <Parameter> <Value>`	`ErrorWriteConfig <Error text>`	Sets a setting for the general browse behavior.

`BrowseTags`:
• Initial request:
`BrowseTags <System> <Page size> --filter <Filter>`
• Next request:
`BrowseTags --next`
	`NotifyBrowseTags <System>::<Tag> ... <System>::<Tag>`	`ErrorBrowseTags <Error text>`	Returns the names of the tags of the local system or all systems communicating via runtime collaboration.

`BrowseConfiguredAlarms`:
• Initial request:
`BrowseConfiguredAlarms <System> <Page size> --filter <Filter>`
• Next request:
`BrowseConfiguredAlarms --next`
	`NotifyBrowseConfiguredAlarms <System>::<Alarm> ... <System>::<Alarm>`	`ErrorBrowseConfiguredAlarms <Error text>`	Returns the names of the configured alarms of the local system or all systems communicating via Runtime Collaboration.

`BrowseAlarmClasses <System>`	`NotifyBrowseAlarmClasses <System>::<Alarm class> ... <System>::<Alarm class>`	`ErrorBrowseConfiguredAlarms <Error text>`	Returns the alarm classes of the local system or all systems communicating via Runtime Collaboration.

Errors and error texts

This help only provides a selection of possible error messages. The error texts can also differ from the texts in your projects.

4.2 Commands

4.2.1 SubscribeTagValue

Description

The command "SubscribeTagValue" subscribes the specified tag for monitoring.

Error handling

- When the tag value contains a line break (\n), the value cannot be signaled. An error is signaled.
- When the same tag is subscribed a second time for monitoring, an error is signaled.
- A global monitoring error is signaled with "ErrorSubscribeTagValue". Because no monitoring was set up, there is no need to unsubscribe the tag from monitoring.
- An error relating to the tag value is signaled with "ErrorNotifyTagValue". Monitoring is set up in this case, but the tag value cannot be signaled for various reasons. Unsubscribe the tag from monitoring when it is no longer needed.

Request

```
SubscribeTagValue <Tag>
```

For example: `SubscribeTagValue Tag_1`

Response

OnSuccess (or partial success):

```
NotifySubscribeTagValue <Tag> <Quality> <Value>
```

For example:

- `NotifySubscribeTagValue Tag_1 Uncertain 0`
- `NotifySubscribeTagValue Tag_1 Good 10`
- `NotifySubscribeTagValue Tag_1 Bad 12`

OnError:

- Global error:
  `ErrorSubscribeTagValue <Tag> <Error text>`
  For example:
  - `ErrorSubscribeTagValue Tag_1 Tag does not exist`
  - `ErrorSubscribeTagValue Tag_1 Subscription already exists`
- Error for tag value:
  `ErrorNotifyTagValue <Tag> <Error text>`
  For example:
  - `ErrorNotifyTagValue Tag_1 Encoding error`
  - `ErrorNotifyTagValue Tag_1 Value contains newline`

4.2.2 UnsubscribeTagValue

Description

The "UnsubscribeTagValue" command unsubscribes a tag from monitoring.

Request

`UnsubscribeTagValue <Tag>`

For example: `UnsubscribeTagValue Tag_1`

Response

OnSuccess:

`NotifyUnsubscribeTagValue <Tag>`

For example:

- `NotifyUnsubscribeTagValue Tag_1`
- `NotifyUnsubscribeTagValue Tag_1`
- `NotifyUnsubscribeTagValue Tag_1`

OnError:

`ErrorUnsubscribeTagValue <Tag> <Error text>`

For example: `ErrorUnsubscribeTagValue Tag_1 Subscription does not exist`

4.2.3 ReadTagValue

Description

The "ReadTagValue" command reads the value of a tag from the system. Only the tag value and the quality are signaled.

When the tag value contains a line break (\n), the value cannot be signaled. An error is signaled.

Request

`ReadTagValue <Tag>`

For example: `ReadTagValue Tag_1`

Response

OnSuccess (or partial success):

`NotifyReadTagValue <Tag> <Quality> <Value>`

For example:

- `NotifyReadTagValue Tag_1 Uncertain 0`
- `NotifyReadTagValue Tag_1 Good 10`
- `NotifyReadTagValue Tag_1 Bad 12`

OnError:

`ErrorReadTagValue <Tag> <Error text>`

For example:

- `ErrorReadTagValue Tag_1 Tag does not exist`
- `ErrorReadTagValue Tag_1 Encoding error`
- `ErrorReadTagValue Tag_1 Value contains newline`

4.2.4 WriteTagValue

Description

The "WriteTagValue" command writes a value to a single tag.

When the transferred tag value contains a line break (\n), only the partial string in front of the line break is written to the tag.

Request

`WriteTagValue <Tag> <Value>`

For example: `WriteTagValue Motor.Label MC001`

Response

OnSuccess (or partial success):

`NotifyWriteTagValue <Tag>`

For example: `NotifyWriteTagValue Motor.Label`

OnError:

`ErrorWriteTagValue <Tag> <Error text>`

For example: `ErrorWriteTagValue Motor.Label Tag does not exist`

4.2.5 SetCharSet

Description

Sets the character encoding to one of the following specified values: {UTF-8, cp437, cp850}

The default character encoding is UTF-8.

The following character coding values must be supported as a minimum:

- UTF-8
- cp850
  In German Windows systems, this is the default for the SystemLocale.
- cp437
  In US Windows systems, this is the default for the SystemLocale.

Internally, strings are treated as Unicode strings (often as UTF-16 in a CFSTR). For external communication over the pipe, the Unicode characters must be converted into a byte representation.

When a character cannot be converted for a specific character coding (e.g. the Greek character "π" in the character coding cp437), an "encoding error" is triggered.

Request

```
SetCharSet <Value>
```

For example: `SetCharSet UTF-8`

Response

OnSuccess:

```
NotifySetCharSet <Value>
```

For example: `NotifySetCharSet UTF-8`

OnError:

```
ErrorSetCharSet <Value> <Error text>
```

For example: `ErrorSetCharSet UTF-9 unknown character set`

4.2.6 ReadConfig

Description

The "ReadConfig" command reads a setting configured for general browse behavior. To read multiple settings, call the command several times.

Request

```
ReadConfig <Param>
```

- `Param`:
  Value: The configuration parameters
  Possible parameters:
  - `DefaultPageSize`
    The page size used when a browse request is called without the "PageSize" parameter
  - `BrowseTimeOut`
    Number of seconds after which an inactive browse request is aborted.

For example:

```
ReadConfig DefaultPageSize
```

OnSuccess
```
NotifyReadConfig <Parameter> <Value>
```

For example:
```
NotifyReadConfig DefaultPageSize 1000
NotifyReadConfig BrowseTimeOut 300
```

OnError
```
ErrorReadConfig <Error description>
```

For example:
```
ErrorReadConfig Invalid arguments passed to browsing function.
```

4.2.7 WriteConfig

Description

The "WriteConfig" command sets a setting configured for general browse behavior. To set multiple settings, call the command several times

Request
```
WriteConfig <Parameter> <Value>
```

- `Parameter`:
  Value: The configuration parameters
  Possible parameters:
  - `DefaultPageSize`
    The page size used when a browse request is called without the "PageSize" parameter
    Preset value: 1000
  - `BrowseTimeOut`
    Number of seconds after which an inactive browse request is canceled.
    Preset value: 300 s

For example:
```
WriteConfig DefaultPageSize 500
```

Response

OnSuccess:
```
NotifyWriteConfig <Parameter>
```

For example:
```
NotifyWriteConfig DefaultPageSize
```

OnError:
```
ErrorWriteConfig <Error description>
```

For example:
```
ErrorWriteConfig Invalid arguments passed to browsing function.
```

4.2.8 BrowseTags

Description

The "BrowseTags" command returns the names of the tags of the local HMI system or all HMI systems communicating via runtime collaboration.

Information on the general browse behavior of the command can be found in section Behavior of the browse commands (Page 11).

If the number of hits exceeds the page size of the response, the command consists of an initial request and 1 to N Next requests:

- You define the query in the initial request.
  It provides a response that delivers the first set of hits.
- You can call the remaining hits via Next requests.

Initial request

```
BrowseTags <System> <Page size> --filter <Filter>
```

- `System`: Optional
  Controls from which system the tags are read.
  - Value: "*"
    All systems that communicate with each other via runtime collaboration
  - Default value: The local system
- `Page size`: Optional
  Controls how many tags a response returns.
  Default value: The configured page size is used. See also section ReadConfig (Page 18).
- `--filter <Filter>`: Optional
  Restricts the command to tags whose "Name" matches the filter.
  - `--filter`: Command line command
  - `<Filter>`: The filter string
    Permitted wildcards:

Wildcard	Description	Example
*	Replaces 0 to more characters	Filter string: "Motor*" Tags contained in the response: • "Motor" • "MotorOn" • "MotorOff"
?	Replaces 1 character	Filter string: "Motor_?" Tags contained in the response: • "Motor_1" • "Motor_2"

  - Default value: All tags of the system specified by `SystemNames` are queried.

For example:
```
BrowseTags * 100 --filter *Tag0* // browse for tags of all systems
with filter and paging
```

Next request

```
BrowseTags --next
```

Response

OnSuccess
```
NotifyBrowseTags <System>::<Tag name> ... <System>::<Tag name>
```

For example:
```
NotifyBrowseTags HMI_RT_1::InternalTag0 HMI_RT_2::InternalTag01
HMI_RT_2::InternalTag02
```

OnError
```
ErrorBrowseTags <Error description>
```

For example:
```
ErrorBrowseTags Invalid arguments passed to browsing function.
```

4.2.9 BrowseConfiguredAlarms

Description

The "BrowseConfiguredAlarms" command returns the names of the configured alarms of the local HMI system or all HMI systems communicating via Runtime Collaboration.

Information on the general browse behavior of the command can be found in section Behavior of the browse commands (Page 11).

If the number of hits exceeds the page size of the response, the command consists of an initial request and 1 to N Next requests:

- You define the query in the initial request.
  It provides a response that delivers the first set of hits.
- You can call the remaining hits via Next requests.

Initial request

```
BrowseConfiguredAlarms <System> <Page size> --filter <Filter>
```

- `System`: Optional
  Controls from which system the alarms are read.
  - Value: "*"
    All systems that communicate with each other via runtime collaboration
  - Default value: The local system
- `Page size`: Optional
  Controls how many alarms a response returns.
  Default value: The configured page size is used. See also section ReadConfig (Page 18).
- `--filter <Filter>`: Optional
  Restricts the command to alarms whose "Name" matches the filter.
  - `--filter`: Command line command
  - `<Filter>`: The filter string
    Permitted wildcards:

Wildcard	Description	Example
*	Replaces 0 to more characters	Filter string: "Motor*:Analog_Alarm" Alarms contained in the response: • "MotorOn:AnalogAlarm" • "MotorOff:AnalogAlarm"
?	Replaces 1 character	Filter string: "Motor_?:Analog_alarm" Alarms contained in the response: • "Motor_1:Analog_alarm" • "Motor_2:Analog_alarm"

  - Default value: All tags of the system specified by `SystemNames` are queried.

For example:
```
BrowseConfiguredAlarms * 100 --filter *Analog* // browse for alarms
of all systems with filter and paging
```

Next request

```
BrowseConfiguredAlarms --next
```

Response

OnSuccess
```
NotifyBBrowseConfiguredAlarms <System>::<Alarm name> ...
<System>::<Alarm name>
```

For example:
```
NotifyBrowseConfiguredAlarms HMI_RT_1::Motor_1:AnalogAlarm_1
HMI_RT_2::Motor_1:AnalogAlarm_1 HMI_RT_2::Motor_2:AnalogAlarm_1
```

OnError
`ErrorBrowseConfiguredAlarms <Error description>`

For example:
`ErrorBrowseConfiguredAlarms A parameter is not valid or out of range.`

4.2.10 BrowseAlarmClasses

Description

The command "`BrowseAlarmClasses`" returns the alarm classes of the local HMI system or all HMI systems communicating via Runtime Collaboration.

Information on the general browse behavior of the command can be found in section Behavior of the browse commands (Page 11).

Note

Paging is not available for "BrowseAlarmClasses".

Request

`BrowseAlarmClasses <System>`

- `System`: Optional
  Controls from which system the tags are read.
  - Value: "*"
    All systems that communicate with each other via runtime collaboration
  - Default value: The local system

For example:

```
BrowseAlarmClasses  //Browse for alarm classes in local system
```

Response

OnSuccess
`NotifyBrowseAlarmClasses <System>::<Alarm class> ... <System>::<Alarm class>`

For example:
```
NotifyBrowseAlarmClasses HMI_RT_1::Alarm
HMI_RT_1::SystemNotification HMI_RT_1::SystemInformation
HMI_RT_1::SystemAlarm HMI_RT_1::Notification
HMI_RT_1::OperatorInputInformation
```

OnError
`ErrorBrowseAlarmClasses <Error description>`

For example:
`ErrorBrowseAlarmClasses Invalid arguments passed to browsing function.`

See also

ReadConfig (Page 18)

4.3 Reference

The following section contains a reference of the properties of tags that you get with the command ReadTagValue.

The commands transfer the property values as string.

Tag properties

"Name" property

Name of the tag

"Value" property

Value of the tag at the moment of the read operation.

"Quality" property

Quality of the read operation of the tag

Possible values:

- "Good"
- "Bad"
- "Uncertain"

"ErrorDescription" property

Description of the error code of the last read or write operation of the tag

Using expert syntax

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5.1 Basics of expert syntax

Characteristics

The expert syntax has the following characteristics:

- Complete JSON commands and replies.
- Commands for individual objects and multiple objects, for example, to write multiple tags in one call.
- Character coding is always UTF-8.
- Cookies are available and mandatory.

Structure of a request

```
{
  "Message": "<Command>",
  "Params":
  {
      "<Object name>":
      [
        "<Param1>",
        "<Param2>"
      ]
  },
  "ClientCookie": "<Cookie name>"
}
```

Structure of a response

OnSuccess

```
{
  "Message": "Notify<Command>",
  "Params":
  {
      "<Object name>":
    [
```

```
        {
          "<Value1>"
        },
        {
          "<Value2>"
        }
      ]
    },
    "ClientCookie": "<Cookie name>"
}
```

OnError

```
{
 "Message": "Error<Command>",
 "ErrorCode": "<Error code>",
 "ErrorDescription": "<Error description>",
 "ClientCookie": "<Cookie name>"
}
```

Overview of the commands of the expert syntax

Command	OnSuccess	OnError	Description
`SubscribeTag <Tag> <ClientCookie>`	`NotifySubscribeTag <Tag name> <Value> <TimeStamp> <Quality> <QualityCode> <hasChanged> <Error code> <Error text> <ClientCookie>`	`ErrorSubscribeTag <Error code> <Error text> <ClientCookie>`	Subscribes one or more tags for monitoring.
`UnsubscribeTag <ClientCookie>`	`NotifyUnsubscribeTag <ClientCookie>`	`ErrorUnsubscribeTag <Error code> <Error text> <ClientCookie>`	Unsubscribes the tag or tags from the cookie from monitoring.
`ReadTag <Tags> <ClientCookie>`	`NotifyReadTag <Tag name> <Value> <TimeStamp> <Quality> <QualityCode> <Errorcode> <Error text> <ClientCookie>`	`ErrorReadTag <Error code> <Error text> <ClientCookie>`	Reads the value of one or more tags of the system.

Command	OnSuccess	OnError	Description
`WriteTag <Tags, Values> <ClientCookie>`	`NotifyWriteTag <Tag name> <Error code> <Error text> <ClientCookie>`	`ErrorWriteTag <Error code> <Error text> <ClientCookie>`	Writes the specified values to the specified tags.
`SubscribeAlarm <Filter> <Systems> <Language> <ClientCookie>`	`NotifySubscribeAlarm <ClientCookie> <Alarms>`	`ErrorSubscribeAlarm <Error code> <Error text> <ClientCookie>`	Subscribes the alarms defined over the filter, the system and the language ID for monitoring.
`UnsubscribeAlarm <ClientCookie>`	`NotifyUnsubscribeAlarm <ClientCookie>`	`Error UnsubscribeAlarm <Error code> <Error text> <ClientCookie>`	Unsubscribes the alarms from the cookie from monitoring.
`ReadAlarm <Filter> <Systems> <Language> <ClientCookie>`	`NotifyReadAlarm <ClientCookie> <Alarms>`	`ErrorReadAlarm <Error code> <Error text> <ClientCookie>`	Reads the alarms defined by the filter, the system and the LanguageID.
`ReadConfig <Parameter> <ClientCookie>`	`NotifyReadConfig <Parameter> <Value> <ClientCookie>`	`ErrorReadConfig <Error code> <Error text> <ClientCookie>`	Reads the settings configured for the general browse behavior.
`WriteConfig <Parameter> <ClientCookie>`	`NotifyWriteConfig <Parameter> <Value> <ClientCookie>`	`ErrorWriteConfig <Error code> <Error text><ClientCookie>`	Sets the settings for the general browse behavior.

`BrowseTags`
• Initial request:
`BrowseTags <LanguageId> <Filter> <Attribute> <PageSize> <Systems> <ClientCookie>`
• Next request:
`BrowseTags <Next> <ClientCookie>`
	`NotifyBrowseTags <Attribute> <Value> ... <Attribute> <Value> <ClientCookie>`	`ErrorBrowseTags <Error code> <Error text> <ClientCookie>`	Returns "Name", "DisplayName" and "DataType" as well as optional additional attribute values of the tags of the local system or several HMI systems communicating via runtime collaboration.

Command	OnSuccess	OnError	Description
`BrowseConfiguredAlarms`: • Initial request: `BrowseConfiguredAlarms <LanguageId> <Filter> <Attributes> <PageSize> <SystemNames> <ClientCookie>` • Next request: `BrowseConfiguredAlarms <Next> <ClientCookie>`	`NotifyBrowseConfiguredAlarms <Alarm class> <Alarms> ... <Alarm class> <Alarms> <ClientCookie>`	`ErrorBrowseConfiguredAlarms <Error code> <Error text> <ClientCookie>`	Returns "AlarmClass", "Name" and "Area" as well as optional further attribute values of the configured alarms of an HMI system or several systems communicating via Runtime Collaboration.
`BrowseAlarmClasses <Filter> <Attributes> <Systems>`	`NotifyBrowseAlarmClasses <Alarm class> ... <Alarm class> <ClientCookie>`	`ErrorBrowseAlarmClasses <Error code> <Error text> <ClientCookie>`	Returns the alarm classes of the local system or all systems communicating via Runtime Collaboration.

Errors and error texts

This help only provides a selection of possible error messages. The error texts can also differ from the texts in your projects.

Attributes of the tags and alarms

You can find a description of the attributes of the tags and alarms in the help document Runtime - Open Development Kit (ODK).

5.2 Commands

5.2.1 SubscribeTag

Description

The "SubscribeTag" command subscribes one or more tags for monitoring. The following properties are monitored:

- Tag value
- Quality
- Quality code
- Time stamp

"NotifiySubscribeTag" always returns all monitored tags, even if only the value of one monitored tag changes. The change can be a change to the quality code, time stamp or tag value. The order of tags in the response corresponds to the order in the "SubscribeTag" request.

It is permitted to have the same tag monitored by multiple "SubscribeTag" calls.

Request

```
{"Message":"SubscribeTag","Params":{"Tags":
["<Tag>","<Tag>"]},"ClientCookie":"<Cookie>"}
```

- `Tags`: List of the tags to be monitored
- `ClientCookie`: Is used for "UnsubscribeTag" and to assign the notification to its monitoring.

For example:

```
{"Message":"SubscribeTag","Params":{"Tags":
["Tag_0","Tag_1"]},"ClientCookie":"mySubscription1"}
```

Response

OnSuccess

```
{"Message":"NotifySubscribeTag", "Params":{"Tags":[{"Name":"<Tag>",
"Quality":"<Value>", "QualityCode":"<Value>",
"TimeStamp":"<Value>", "Value":"<Tag value>",
"ErrorCode":<Value>, "ErrorDescription":"<Error text>"},
{"Name":"<Tag>", "Quality":"<Value>", "QualityCode":"<Value>",
"TimeStamp":"<Value>", "Value":"<Tag value>", "ErrorCode":<Value>,
"ErrorDescription":"<Error text>"}]}, "ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"NotifySubscribeTag", "Params":{"Tags":[{"Name":"Tag_0",
"Quality":"Good", "QualityCode":"192",
"TimeStamp":"2019-01-30T11:25:35Z", "Value":"16", "ErrorCode":0,
"ErrorDescription":""}, {"Name":"Tag_1", "Quality":"Uncertain",
"QualityCode":"76", "TimeStamp":"2019-01-30T11:25:35Z",
"Value":"1", "ErrorCode":-2147483620, "ErrorDescription":"Tag does
not exist"}]}, "ClientCookie":"mySubscription1"}
```

OnError

```
{"Message":"ErrorSubscribeTag", "ErrorCode":<Value>,
"ErrorDescription":"<Error text>", "ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"ErrorSubscribeTag", "ErrorCode":-2147483621,
"ErrorDescription":"Subscription could not be created",
"ClientCookie":"mySubscription1"}
```

5.2.2 UnsubscribeTag

Description

The "UnsubscribeTag" command unsubscribes a tag from monitoring that was started with the cookie transferred in the call of "SubscribeTag".

Request

```
{"Message":"UnsubscribeTag","ClientCookie":"<Cookie>"}
```

For example:
```
{"Message":"UnsubscribeTag","ClientCookie":"mySubscription1"}
```

Response

OnSuccess

```
{"Message":"NotifyUnsubscribeTag","ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"NotifyUnsubscribeTag","ClientCookie":"mySubscription1"}
```

OnError

```
{"Message":"ErrorUnsubscribeTag", "ErrorCode":<Value>,
"ErrorDescription":"<Error text>", "ClientCookie":"Cookie"}
```

For example:

```
{"Message":"ErrorUnsubscribeTag", "ErrorCode":-2147483621,
"ErrorDescription":"Subscription could not be closed",
"ClientCookie":"mySubscription1"}
```

5.2.3 ReadTag

Description

The "ReadTag" command reads multiple tags. The tag value, the quality, the quality code and the time stamp are signaled.

The order of tags in the response corresponds to the order in the "ReadTag" request.

Request

```
{"Message":"ReadTag","Params":{"Tags":
["<Tag>","<Tag>"]},"ClientCookie":"<Cookie>"}
```

For example:
```
{"Message":"ReadTag","Params":{"Tags":
["Tag_0","Tag_1"]},"ClientCookie":"myRequest1"}
```

Response

OnSuccess

```
{"Message":"NotifyReadTag","Params":{"Tags":
[{"Name":"<Tag>","Quality":"<Value>","QualityCode":"<Value>","TimeSt
amp":"<Value>","Value":"<TagValue>","ErrorCode":<Value>,"ErrorDescri
ption":"<ErrorText>"},
{"Name":"<Tag>","Quality":"<Value>","QualityCode":"<Value>","TimeSta
mp":"<Value>","Value":"<TagValue>","ErrorCode":<Value>,"ErrorDescrip
tion":"<ErrorText>"}]},"ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"NotifyReadTag","Params":{"Tags":
[{"Name":"Tag_0","Quality":"Good","QualityCode":"192","TimeStamp":"2
019-01-30T11:25:35Z","Value":"16","ErrorCode":0,"ErrorDescription":"
"},
{"Name":"Tag_1","Quality":"Uncertain","QualityCode":"76","TimeStamp"
:"2019-01-30T11:25:35Z","Value":"1","ErrorCode":-2147483620,"ErrorDe
scription":"Tag does not exist"}]},"ClientCookie":"myRequest1"}
```

OnError

```
{"Message":"ErrorReadTag","ErrorCode":<Value>,"ErrorDescription":"<E
rror text>", "ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"ErrorReadTag","ErrorCode":-2147483621,"ErrorDescription"
:"Failed to Read", "ClientCookie":"myRequest1"}
```

5.2.4 WriteTag

Description

The "WriteTag" command writes the values of multiple tags.

Request

```
{"Message":"WriteTag","Params":{"Tags":
[{"Name":"<Tag>","Value":"<Tag value>"},
{"Name":"<Tag>","Value":"<Tag value>"}]},"ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"WriteTag","Params":
{"Tags":[{"Name":"Tag_0","Value":"50"},
{"Name":"Tag_1","Value":"40"}]},"ClientCookie":"myRequest2"}
```

Response

OnSuccess

```
{"Message":"NotifyWriteTag","Params":{"Tags":
[{"Name":"<Tag>","ErrorCode":<Value>,"ErrorDescription":"<ErrorText>
"},
{"Name":"<Tag>","ErrorCode":<Value>,"ErrorDescription":"<ErrorText>"
}]},"ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"NotifyWriteTag","Params":{"Tags":
[{"Name":"Tag_0","ErrorCode":0,"ErrorDescription":""},
{"Name":"Tag_1","ErrorCode":-2147483620,"ErrorDescription":"Tag
does not exist"}]},"ClientCookie":"myRequest2"}
```

OnError

```
{"Message":"ErrorWriteTag","ErrorCode":<Value>,"ErrorDescription":"<
Error text>", "ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"ErrorWriteTag","ErrorCode":-2147483621,"ErrorDescription
":"Failed to Write", "ClientCookie":"myRequest2"}
```

5.2.5 SubscribeAlarm

Description

The "SubscribeAlarm" command subscribes systems for monitoring of changes of active alarms.

The first time "NotifySubscribeAlarm" is called, all active alarms are queried. Afterwards "NotifySubscribeAlarm" is only called if the status of an alarm changes.

Request

```
{"Message":"SubscribeAlarm","Params":{"SystemNames":
["<System>","<System>"],"Filter":"<Filter>","LanguageId":<ID>},"Clie
ntCookie":"<Cookie>"}
```

- `SystemNames`: Optional
  When the list is empty or missing, all known systems are subscribed for monitoring.
- `Filter`: Optional
- `LanguageID`: Optional
- `ClientCookie`:
  Is used for "UnsubscribeAlarm" and to assign the notification to its monitoring.

For example:

```
{"Message":"SubscribeAlarm","Params":{"SystemNames":
["System0","System1"],"Filter":"AlarmClassName !=
'Warning'","LanguageId":1033},"ClientCookie":"CookieForSubscribeAlar
ms123"}
```

Response

OnSuccess

```
{"Message":"NotifySubscribeAlarm","ClientCookie":"<Cookie>","params"
:{"Alarms":[{<Key value pairs for the properties of the first
alarm>},{<Key value pairs for the properties of the second alarm>},
{<...>}]}}
```

For example:


```
{"Message":"NotifySubscribeAlarm","ClientCookie":"CookieForSubscribe
Alarms123","params":{"Alarms":[{"AcknowledgmentTime":"1970-01-01
00:00:00.0000000","AlarmClassName":"Alarm","AlarmClassSymbol":"Alarm
","AlarmText1":"","AlarmText2":"","AlarmText3":"","AlarmText4":"","A
larmText5":"","AlarmText6":"","AlarmText7":"","AlarmText8":"","Alarm
Text9":"","Area":"","BackColor":"4294967295","ChangeReason":"3","Cle
arTime":"1970-01-01
00:00:00.0000000","Connection":"1.0.0.0.0.0","DeadBand":"No
deadband
configured.","Duration":"00:00:01.7431098","EventText":"","Flashing"
:"FALSE","HostName":"md1z5cpc","ID":"0","InfoText":"","InstanceID":"
9","LoopInAlarm":"","ModificationTime":"2019-01-30
11:25:39.9780320","Name":"RUNTIME_1::Tag_2:Alarm2","NotificationReas
on":"1","Origin":"","Priority":"1","RaiseTime":"2019-01-30
11:25:39.9780320","ResetTime":"1970-01-01
00:00:00.0000000","SourceID":"","SourceType":"1","State":"1","StateM
achine":"7","StateText":"R","SuppressionState":"0","SystemSeverity":
"0","Tag":"RUNTIME_1::Tag_2","TextColor":"4278190080","UserName":"",
"Value":"7","ValueLimit":"No limit
configured.","ValueQuality":"192"},
{"AcknowledgmentTime":"1970-01-01
00:00:00.0000000","AlarmClassName":"Alarm","AlarmClassSymbol":"Alarm
","AlarmText1":"","AlarmText2":"","AlarmText3":"","AlarmText4":"","A
larmText5":"","AlarmText6":"","AlarmText7":"","AlarmText8":"","Alarm
Text9":"","Area":"","BackColor":"4294967295","ChangeReason":"3","Cle
arTime":"1970-01-01
00:00:00.0000000","Connection":"1.0.0.0.0.0","DeadBand":"No
deadband
configured.","Duration":"00:00:01.7431098","EventText":"","Flashing"
:"FALSE","HostName":"md1z5cpc","ID":"0","InfoText":"","InstanceID":"
9","LoopInAlarm":"","ModificationTime":"2019-01-30
11:25:39.9780320","Name":"RUNTIME_1::Tag_2:Alarm1","NotificationReas
on":"1","Origin":"","Priority":"1","RaiseTime":"2019-01-30
11:25:39.9780320","ResetTime":"1970-01-01
00:00:00.0000000","SourceID":"","SourceType":"1","State":"1","StateM
achine":"7","StateText":"R","SuppressionState":"0","SystemSeverity":
"0","Tag":"RUNTIME_1::Tag_2","TextColor":"4278190080","UserName":"",
"Value":"7","ValueLimit":"No limit
configured.","ValueQuality":"192", "AlarmGroupID": "1"}]}
```


OnError


```
{"Message":"ErrorSubscribeTag", "ErrorCode":<Value>,
"ErrorDescription":"<Error text>", "ClientCookie":"<Cookie>"}
```


For example:


```
{"Message":"ErrorSubscribeAlarm","ErrorCode":"-2147483621","ErrorDes
cription":"Alarm Subscription failed because of invalid
filter","ClientCookie":"CookieForSubscribeAlarms123"}
```

5.2.6 UnsubscribeAlarm

Description

The "UnsubscribeAlarm" command unsubscribes the alarms from monitoring that was started with the cookie transferred in the call of "SubscribeAlarm".

Request

```
{"Message":"UnsubscribeAlarm","ClientCookie":"<Cookie>"}
```

For example:
```
{"Message":"UnsubscribeAlarm","ClientCookie":"CookieForSubscribeAlarms123"}
```

Response

OnSuccess

```
{"Message":"NotifyUnsubscribeAlarm","ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"NotifyUnsubscribeAlarm","ClientCookie":"CookieForSubscribeAlarms123"}
```

OnError

```
{"Message":”ErrorUnsubscribeAlarm","ErrorCode":<Value>,"ErrorDescription":"<Error text>", "ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"ErrorUnsubscribeAlarm","ErrorCode":-2147483621,"ErrorDescription":"Subscription could not be closed",
"ClientCookie":"CookieForSubscribeAlarms123"}
```

5.2.7 ReadAlarm

Description

The "ReadAlarm" command reads all active alarms.

Request

```
{"Message":"ReadAlarm","Params":{"SystemNames":
["<System>","<System>"],"Filter":"<Value>","LanguageId":<Value>},"ClientCookie":"<Cookie>"}
```

- `SystemNames`: Optional
  When the list is empty or missing, all known systems are subscribed for monitoring.
- `Filter`: Optional

- `LanguageID`: Optional
- `ClientCookie`:
  Is used for "UnsubscribeAlarm" and to assign the notification to its monitoring.

For example:

```
{"Message":"ReadAlarm","Params":{"SystemNames":
["System0","System1"],"Filter":"","LanguageId":1033},"ClientCookie":
"CookieForReadAlarmRequest456"}
```

Response

```
{"Message":"NotifyReadAlarm", "ClientCookie":"<Cookie>","params":
{"Alarms":[{<Key value pairs for properties of the first alarm>},
{<Key value pairs for the properties of the second alarm>},
{<...>}]}}
```

OnSuccess

For example:

```
{"Message":"NotifyReadAlarm",
"ClientCookie":"CookieForReadAlarmRequest456", "params":{"Alarms":
[{"AcknowledgmentTime":"1970-01-01 00:00:00.0000000",
"AlarmClassName":"Alarm",
"AlarmClassSymbol":"Alarm","AlarmText1":"","AlarmText2":"","AlarmTex
t3":"","AlarmText4":"","AlarmText5":"","AlarmText6":"","AlarmText7":
"","AlarmText8":"","AlarmText9":"","Area":"","BackColor":"4294967295
","ChangeReason":"3","ClearTime":"1970-01-01
00:00:00.0000000","Connection":"1.0.0.0.0.0","DeadBand":"No
deadband
configured.","Duration":"00:00:01.7431098","EventText":"","Flashing"
:"FALSE","HostName":"md1z5cpc","ID":"0","InfoText":"","InstanceID":"
9","LoopInAlarm":"","ModificationTime":"2019-01-30
11:25:39.9780320","Name":"RUNTIME_1::Tag_2:Alarm2","NotificationReas
on":"1","Origin":"","Priority":"1","RaiseTime":"2019-01-30
11:25:39.9780320","ResetTime":"1970-01-01
00:00:00.0000000","SourceID":"","SourceType":"1","State":"1","StateM
achine":"7","StateText":"R","SuppressionState":"0","SystemSeverity":
"0","Tag":"RUNTIME_1::Tag_2","TextColor":"4278190080","UserName":"",
"Value":"7","ValueLimit":"No limit
configured.","ValueQuality":"192"},
{"AcknowledgmentTime":"1970-01-01
00:00:00.0000000","AlarmClassName":"Alarm","AlarmClassSymbol":"Alarm
","AlarmText1":"","AlarmText2":"","AlarmText3":"","AlarmText4":"","A
larmText5":"","AlarmText6":"","AlarmText7":"","AlarmText8":"","Alarm
Text9":"","Area":"","BackColor":"4294967295","ChangeReason":"3","Cle
arTime":"1970-01-01
00:00:00.0000000","Connection":"1.0.0.0.0.0",DeadBand":"No deadband
configured.","Duration":"00:00:01.7431098","EventText":"","Flashing"
:"FALSE","HostName":"md1z5cpc","ID":"0","InfoText":"","InstanceID":"
9","LoopInAlarm":"","ModificationTime":"2019-01-30
11:25:39.9780320","Name":"RUNTIME_1::Tag_2:Alarm1","NotificationReas
on":"1","Origin":"","Priority":"1","RaiseTime":"2019-01-30
11:25:39.9780320","ResetTime":"1970-01-01
```

```
00:00:00.0000000","SourceID":"","SourceType":"1","State":"1","StateM
achine":"7","StateText":"R","SuppressionState":"0","SystemSeverity":
"0","Tag":"RUNTIME_1::Tag_2","TextColor":"4278190080","UserName":"",
"Value":"7","ValueLimit":"No limit
configured.","ValueQuality":"192"", "AlarmGroupID": "1"}]}
```

OnError

```
{"Message":"ErrorReadAlarm","ErrorCode":<Value>,
"ErrorDescription":"<Error text>", "ClientCookie":"<Cookie>"}
```

For example:

```
{"Message":"ErrorReadAlarm","ErrorCode":-2147483621,
"ErrorDescription":"Alarm Subscription failed because of invalid
filter", "ClientCookie":"CookieForReadAlarmRequest456"}
```

5.2.8 ReadConfig

Description

The "ReadConfig" command reads the settings configured for the general browse behavior.

Request

```
{"Message": "ReadConfig",  "Params": ['<Parameter>',
'<Parameter>'],  "ClientCookie": '<Cookie>'}
```

- `Params`:
  Value: Comma-separated list of configuration parameters
  Possible parameters:
  - `DefaultPageSize`
    The page size used when a browse request is called without the "PageSize" parameter
  - `BrowseTimeOut`
    Number of seconds after which an inactive browse request is canceled.
- `Cookie`:
  Name of the response cookie

For example:

```
{"Message": "ReadConfig", "Params": ['DefaultPageSize',
'BrowseTimout'], "ClientCookie": "myBrowseAlarmsRequest1"}
```

OnSuccess

```
{"Message":"NotifyReadConfig", "Params": {"<Parameter>":<Value>,
"<Parameter>":<Value>}, "ClientCookie": '<Cookie>'}
```

For example:

```
{"Message":"NotifyReadConfig", "Params": {"DefaultPageSize":500,
"BrowseTimeOut":60}, "ClientCookie": "myBrowseAlarmsRequest1"}
```

OnError

```
{"Message": "ErrorReadConfig",  "ErrorCode": "<Code>",
"ErrorDescription": "<Description>", "ClientCookie": "<Cookie>"}
```

For example:
```
{"Message": "ErrorReadConfig",  "ErrorCode": "-2165322729",
"ErrorDescription": "Invalid arguments passed to browsing
function.", "ClientCookie": "myBrowseAlarmsRequest1"}
```

5.2.9 WriteConfig

Description

The "WriteConfig" command sets configurable settings for the general browse behavior.

Request
```
{"Message": "WriteConfig",  "Params": ["<Parameter>":<Value>,
"<Parameter>":<Value>],  "ClientCookie": '<Cookie>'}
```

- `Params`:
  Value: Comma-separated list of configuration parameters and their values
  Possible parameters:
  - `DefaultPageSize`
    The page size used when a browse request is called without the "PageSize" parameter
    Preset value: 1000
  - `BrowseTimeOut`
    Number of seconds after which an inactive browse request is canceled.
    Preset value: 300 s
- `Cookie`:
  Name of the response cookie

For example:
```
{"Message": "WriteConfig", "Params": ["DefaultPageSize":500,
"BrowseTimout":60], "ClientCookie": "myBrowseAlarmsRequest1"}
```

OnSuccess
```
{"Message":"NotifyWriteConfig", "Params": {"<Parameter>":<Value>,
"<Parameter>":<Value>}, "ClientCookie": '<Cookie>'}
```

For example:
```
{"Message":"NotifyWriteConfig", "Params": {"DefaultPageSize":500,
"BrowseTimeOut":60}, "ClientCookie": "myBrowseAlarmsRequest1"}
```

OnError
```
{"Message": "ErrorWriteConfig",  "ErrorCode": "<Code>",
"ErrorDescription": "<Description>" "ClientCookie": "<Cookie>"}
```

For example:
```
{"Message": "ErrorWriteConfig",  "ErrorCode": "-2165322733",
"ErrorDescription": "A parameter is not valid or out of range.",
"ClientCookie": "myBrowseAlarmsRequest1"}
```

5.2.10 BrowseTags

Description

The "BrowseTags" command returns "Name", "DisplayName" and "DataType" as well as optional further attribute values of the tags of an HMI system or several HMI systems communicating via runtime collaboration.

Information on the general browse behavior of the command can be found in section Behavior of the browse commands (Page 11).

If the number of hits exceeds the page size of the response, the command consists of an initial request and 1 to N Next requests:

- You define the query in the initial request.
  It provides a response that delivers the first set of hits.
- You can call the remaining hits via Next requests.

Initial request

```
{"Message": "BrowseTags",  "Params": {"LanguageId": <Value>,
"Filter": "<String>", "Attributes": ["<Attribute name>", ...,
"<Attribute name>"], "PageSize": <Value>, "SystemNames":
["<Name>",  ..., "<Name>"]}, "ClientCookie": "<Cookie>"}
```

- `LanguageId`: Optional
  Controls in which language the "DisplayName" of the tags is returned.
  - Value: The language ID
  - Default value: The default language of the system from which the tag originates
- `Filter`: Optional
  Restricts the command to tags whose "Name" matches the filter.
  - Value: Filter string
    Permitted wildcards:

Wildcard	Description	Example
*	Replaces 0 to more characters	Filter string: "Motor*" Tags contained in the response: • "Motor" • "MotorOn" • "MotorOff"
?	Replaces 1 character	Filter string: "Motor_?" Tags contained in the response: • "Motor_1" • "Motor_2"

  - Default value: All tags of the system specified by `SystemNames` are queried.

- `Attributes`: Optional
  Controls which tag attributes returns the response:
  - Value: Comma-separated enumeration of the attribute names
    The response returns "Name", "DisplayName" and "DataType" as well as the specified attributes.
  - Value: "*"
    The response provides all attributes supported by the TIA Portal for tags: Name, DisplayName, AcquisitionMode, Persistent, DataType, Connection, AcquisitionCycle, MaxLength, SubstituteValueUsage, InitialValue, SubstituteValue, InitialMaxValue, InitialMinValue, Address
  - Default value: The response returns "Name", "DisplayName" and "DataType".
- `PageSize`: Optional
  Controls how many tags a response returns.
  Default value: The configured page size is used. See also section ReadConfig (Page 38).
- `SystemNames`: Optional
  Controls from which system the tags are read.
  - Value: "*"
    All systems that communicate with each other via runtime collaboration
  - Value: Comma-separated list of systems that communicate with each other via runtime collaboration
    FOR EXAMPLE: "HMI_RT_1", "HMI_RT_2"
  - Default value: The local system
- `ClientCookie`:
  Value: Name of the response cookie

For example:
```
{"Message": "BrowseTags",  "Params": {"LanguageId": 1033,
"Filter": "*InternalTag_Bool_1*", "Attributes": ["AcquisitionMode",
"MaxValue"], "PageSize": 50, "SystemNames": ["HMI_RT_1",
"HMI_RT_2"]}, "ClientCookie": "myBrowseTagRequest1"}
```

Next request

```
{"Message": "BrowseTags", "Params": "Next", "ClientCookie":
"<Cookie>"}
```

For example:
```
{"Message": "BrowseTags", "Params": "Next", "ClientCookie":
"myBrowseTagRequest1"}
```

Response

OnSuccess
```
{"ClientCookie": "<Cookie>", "Message": "NotifyBrowseTags",
"Params": {"Tags": [{"<Attribute name":<Value>, "<Attribute
name>":<Value>, "DataType":<Value>, "DisplayName": "<Value>",
"Name":"<Value>"}],}}
```

For example:
```
{"ClientCookie": "<myBrowseTagRequest1>", "Message":
"NotifyBrowseTags", "Params": {"Tags":
[{"AcquisitionMode":0, "MaxValue":1000, "DataType":1,
"DisplayName": "HMI_RT_1::InternalTag_Bool_1",
"Name":"HMI_RT_1::InternalTag_Bool_1"}],}}
```

OnError
```
{"Message": "ErrorBrowseTags", "ErrorCode": "<Code>",
"ErrorDescription": "<Description>", "ClientCookie": "Cookie>"}
```

For example:
```
{"Message": "ErrorBrowseTags", "ErrorCode": "-2165323798",
"ErrorDescription": "Invalid system name.", "ClientCookie":
myBrowseTagRequest1"}
```

5.2.11 BrowseConfiguredAlarms

Description

The "BrowseConfiguredAlarms" command returns "AlarmClass", "Name" and "Area" as well as optional further attribute values of the configured alarms of an HMI system or several systems communicating via Runtime Collaboration.

Information on the general browse behavior of the command can be found in section Behavior of the browse commands (Page 11).

If the number of hits exceeds the page size of the response, the command consists of an initial request and 1 to N Next requests:

- You define the query in the initial request.
  It provides a response that delivers the first set of hits.
- You can call the remaining hits via Next requests.

Initial request

```
{"Message": "BrowseConfiguredAlarms",  "Params": {"LanguageId":
<Value>, "Filter": "<String>", "Attributes": ["<Attribute
name>", ..., "<Attribute name>"], "PageSize": <Value>,
"SystemNames": ["<Name>", ..., "<Name>"]}, "ClientCookie":
"<Cookie>"}
```

- `LanguageId`: Optional
  Controls in which language the alarm texts are returned.
  - Value: The language ID
  - Default value: The default language of the system from which the alarm originates
- `Filter`: Optional
  Restricts the command to alarms whose "Name" matches the filter.
  - Value: Filter string
    Permitted wildcards:

Wildcard	Description	Example
*	Replaces 0 to more characters	Filter string: "Motor*:Analog_Alarm" Alarms contained in the response: • "MotorOn:AnalogAlarm" • "MotorOff:AnalogAlarm"
?	Replaces 1 character	Filter string: "Motor_?:Analog_alarm" Alarms contained in the response: • "Motor_1:Analog_alarm" • "Motor_2:Analog_alarm"

  - Default value: All alarms of the system specified by `SystemNames` are queried.
- `Attributes`: Optional
  Controls which alarm attributes the response returns:
  - Value: Comma-separated enumeration of the attribute names
    The response returns "AlarmClass", "Name" and "Area" as well as the specified attributes.
  - Value: "*"
    The response returns the following attributes: Name, ID, SourceType, AlarmClassName, Priority, EventText, AlarmText1, AlarmText2, AlarmText3, AlarmText4, AlarmText5, AlarmText6, AlarmText7, AlarmText8, AlarmText9, InfoText, Group, Origin, Area
  - Default: The response returns "AlarmClass", "Name" and "Area".
- `PageSize`: Optional
  Controls how many alarms a response returns.
  Default value: The configured page size is used. See also section ReadConfig (Page 38).

- `SystemNames`: Optional
  Controls from which system the alarms are read.
  - Value: "*"
    All systems that communicate with each other via runtime collaboration
  - Value: Comma-separated list of systems that communicate with each other via runtime collaboration
    FOR EXAMPLE: "HMI_RT_1", "HMI_RT_2"
  - Default value: The local system
- `ClientCookie`:
  Value: Name of the response cookie

For example:
```
{"Message": "BrowseConfiguredAlarms", "Params": {"LanguageId":
1033, "Filter": "*alarm_*", "Attributes": ["Priority"],
"PageSize": 50, "SystemNames": ["HMI_RT_1"], }, "ClientCookie":
"myBrowseAlarmsRequest1"}
```

Next request

```
{"Message": "BrowseConfiguredAlarms", "Params": "Next",
"ClientCookie": "<Cookie>"}
```

For example:
```
{"Message": "BrowseConfiguredAlarms", "Params": "Next",
"ClientCookie": "myBrowseAlarmsRequest1"}
```

Response

OnSuccess
```
{"ClientCookie": "<Cookie>", "Message":
"NotifyBrowseConfiguredAlarms", "Params":
{"AlarmClasses":[{"AlarmClassName":"<Value>", "Alarms":
[{"AlarmClassName":"<Value>", "Area":<Value>, "Name":<Value>,
"Name":<Value>, "Priority":<Value>}, {"AlarmClassName":"<Value>",
"Area":<Value>, ...}], {"AlarmClassName":"<Value>", "Alarms":
[{"AlarmClassName": "<Value>, ...}]}
```

For example:
```
{"ClientCookie":"myBrowseAlarmsRequest1",
"Message":"NotifyBrowseConfiguredAlarms", "Params":{"AlarmClasses":
[{"Name":"HMI_RT_1::Warning",
"Alarms":[{"AlarmClassName":"HMI_RT_1::Warning",
"Area":"HMI_RT_1::Alarming",
"Name":"HMI_RT_1::Tag6:Analog_alarm_2", "Priority":12},
{"AlarmClassName":"HMI_RT_1::Warning",
"Area":"HMI_RT_1::Alarming",
"Name":"HMI_RT_1::AlarmTag_1:Discrete_alarm_1", "Priority":12}]}]}}
```

OnError
```
{"Message": "ErrorBrowseConfiguredAlarms", "ErrorCode": "<Code>",
"ErrorDescription": "<Description>", "ClientCookie": "Cookie>"}
```

For example:
```
{"Message": "ErrorBrowseAlarms", "ErrorCode": "-2165323798 /
-2165322773", "ErrorDescription": "Invalid system name.", or
"Your browse request has been expired", "ClientCookie":
"myBrowseAlarmsRequest1"}
```

5.2.12 BrowseAlarmClasses

Description

The command "`BrowseAlarmClasses`" returns the alarm classes of the local HMI system or all HMI systems communicating via Runtime Collaboration.

Information on the general browse behavior of the command can be found in section Behavior of the browse commands (Page 11).

Request
```
{"Message": "BrowseAlarmClasses", "Params": {"Filter": <String>,
"Attributes"["<Attribute name>", ..., "<Attribute name>"],
"SystemNames": ["<Name>", ..., "<Name>"]}, "ClientCookie":
"<Cookie>"}
```

- `Filter`: Optional
  Restricts the command to alarm classes whose "Name" matches the filter.
  - Value: Filter string
    Permitted wildcards:

Wildcard	Description	Example
*	Replaces 0 to more characters	Filter string: "*Alarm" Alarm classes contained in the response: • "Alarm" • "SystemAlarm"
?	Replaces 1 character	Filter string: "Alarm_Prio_? Alarms contained in the response: • "Alarm_Prio_1" • "Alarm_Prio_2"

  - Default value: All alarm classes of the system specified by `SystemNames` are queried.
- `Attributes`: Optional
  Controls which attributes of the alarm class return the response:
  - Value: Comma-separated enumeration of attributes
    The response returns "Name" and "StateMachine" as well as the specified attributes.
  - Value: "*"
    The response returns the following attributes: Name, StateMachine, ID, Priority, NormalStateTextColor, NormalStateBackColor, RaisedStateTextColor, RaisedStateBackColor, RaisedStateFlashing, AcknowledgedStateTextColor, AcknowledgedStateBackColor, AcknowledgedStateFlashing, ClearedStateTextColor, ClearedStateBackColor, ClearedStateFlashing, AcknowledgedClearedStateTextColor, AcknowledgedClearedStateBackColor, AcknowledgedClearedStateFlashing
  - Default: The response returns "Name" and "StateMachine".
- `System`: Optional
  Controls from which system the tags are read.
  - Value: "*"
    All systems that communicate with each other via runtime collaboration
  - Value: Comma-separated list of systems that communicate with each other via runtime collaboration
    FOR EXAMPLE: "HMI_RT_1", "HMI_RT_2"
  - Default value: The local system

For example:

```
{"Message": "BrowseAlarmClasses", "Params": {"Filter":
"*Alarm*", "SystemNames": ["HMI_RT_1"]}, "ClientCookie":
"myBrowseAlarmClassRequest1"} //Browse for alarm classes in
specified system with filter
```

Response

OnSuccess

```
NotifyBrowseAlarmClasses <System>::<Alarm class> ...
<System>::<Alarm class>
```

For example:
```
NotifyBrowseAlarmClasses HMI_RT_1::Alarm
HMI_RT_1::SystemNotification HMI_RT_1::SystemInformation
HMI_RT_1::SystemAlarm HMI_RT_1::Notification
HMI_RT_1::OperatorInputInformation
```

OnError
```
ErrorBrowseAlarmClasses <Error description>
```

For example:
```
ErrorBrowseAlarmClasses Invalid arguments passed to browsing
function.
```

5.3 Reference

The following section contains a reference of the properties of alarms and tags that you get with the commands ReadAlarm and ReadTag.

The commands transfer the property values as string.

Tag properties

"Name" property

Name of the tag

"Value" property

Value of the tag at the moment of the read operation.

"Quality" property

Quality of the read operation of the tag

Possible values:

- "Good"
- "Bad"
- "Uncertain"

"QualityCode" property

Quality code of the read operation of the tag

"TimeStamp" property

Time stamp of the last successful read operation of the tag

"Error" property

Error code of the last read or write operation of the tag

"ErrorDescription" property

Description of the error code of the last read or write operation of the tag

Alarm properties

"InstanceID" property

InstanceID for an alarm with multiple instances

"SourceID" property

Source at which the alarm was triggered.

"Name" property

Name of the alarm

"AlarmClassName" property

Name of the alarm class

"AlarmClassSymbol" property

Symbol of the alarm class

"AlarmParameterValues" property

Parameter values of the alarm

"AlarmText1" ... "AlarmText9" properties

Additional texts 1-9 of the alarm

"ChangeReason" property

Trigger event of the modification of the alarm state

"Connection" property

Connection via which the alarm was triggered.

"State" property

Current alarm state

The property can contain the following values:

- "0": Normal
- "1": Raised
- "2": RaisedCleared
- "5": RaisedAcknowledged
- "6": RaisedAcknowledgedCleared
- "7": RaisedClearedAcknowledged
- "8": Removed

"StateText" property

Current alarm state as text, e.g. "active" or "inactive"

"EventText" property

Text that describes the alarm event.

"InfoText" property

Text that describes an operator instruction for the alarm.

"TextColor" property

Number with the text color of the alarm state

"BackColor" property

Number with the background color of the alarm state

"Flashing" property

Indicates whether the alarm flashes.

Values: "TRUE" or "FALSE"

"ModificationTime" property

Time of last modification to the alarm state

"RaiseTime" property

Trigger time of the alarm

"AcknowledgementTime" property

Time of alarm acknowledgment

"ClearTime" property

Time of alarm reset

"ResetTime" property

Time of alarm reset

"SuppressionState" property

Status of alarm visibility

"SystemSeverity" property

Severity of the system error

"Priority" property

Relevance for display and sorting of the alarm

"Origin" property

Origin for display and sorting of the alarm

"Area" property

Origin for display and sorting of the alarm

"Value" property

Current process value of the alarm

"ValueQuality" property

Quality of the process value of the alarm

"ValueLimit" property

Limit of the process value of the alarm

"UserName" property

User name of the operator control alarm

"HostName" property

Name of the host that triggered the alarm.

"ID" property

ID of the alarm that is also used in the display.

"AlarmGroupID" property

ID of the alarm group to which alarm belongs.

"SourceType" property

Source from which the alarm was generated, e.g. tag-based, controller-based or system-based alarm.

```
HmiAlarmSourceType SourceType { get; }
```

The enumeration "HmiAlarmSourceType" can contain the following values:

- `Undefined` (0)
- `Tag` (1)
- `Controller` (2)
- `System` (3)
- `Alarm` (4)

"DeadBand" property

Range of the triggering tag, in which no alarms are generated.

```
object DeadBand { get; }
```

"LoopInAlarm" property

Function that navigates from the alarm control to its origin.

```
string LoopInAlarm { get; }
```

"NotificationReason" property

Reason for the notification

The property can contain the following values:

- `"0": Unknown`
- `"1": Add`
  The alarm was added to the filtered result list. The alarm meets the filter criteria that apply to the monitoring.
- `"2": Modify`
  Properties of the alarm were changed, but the alarm is still part of the filtered result list.
- `"3": Remove`
  The alarm was part of the result list, but it no longer meets the filter criteria due to changes to its properties.

Note

Changes to the alarms will not result in notifications until the alarm again meets the filter criteria. In this case, "NotificationReason" is set to `Add`.

Note

Removing an alarm from business logic

The use case of the client determines whether the client ignores notifications via alarms with the "NotificationReason" `Modify` or `Remove`.

For example:

- State-based monitoring: The client wants to show a list of incoming alarms. All notification reasons are relevant. The client removes an alarm from the list as soon as the notification reason is `Remove`.
- Event-based monitoring: The client wants to send an email when an alarm comes in. Only the notification reason `Add` is relevant.

Example:

A customer application begins monitoring with the filter criterion "State" = 1. An alarm is triggered. Runtime notifies the customer application of the "NotificationReason" as follows:

NotificationReason	Description
Add	• The "State" property is 1. The alarm is active.
Modify	• The "State" property has not changed. • Another property that is not part of the filter criterion has changed, e.g. "Priority".
Remove	The "State" property has changed, e.g. alarm is inactive.

"Duration" property

Returns the time interval in nanoseconds between triggering of the alarm and its previous status change.

5.4 Syntax of the alarm filter

With an AlarmSubscription, a filter can be transferred so that not all active alarms of the alarm system are notified, but only those which match the filter. The filter syntax is based on SQL syntax. However, only the WHERE instruction is relevant. The keyword "WHERE" must be omitted.

Operators

The following operators can be used in the filter string of the alarm filter:

Operator	Description	Example
`=`	equal to	`Name = 'Recipe246'`
`<>`	not equal	`Value <> 0.0`
`>`	greater than	`Value > 25.0`
`<`	less than	`Value < 75.0`
`>=`	greater than or equal to	`Value >= 25.0`
`<=`	less than or equal to	`Value <= 75.0`
`OR, ||`	logical OR	`State = 1 OR State = 3`
`AND, &&`	logical AND	`Value >= 25.0 AND Value <= 75.0`
`BETWEEN`	within a range	`Value BETWEEN 25.0 AND 75.0`
`NOT BETWEEN`	outside a range	`Value NOT BETWEEN 25.0 AND 75.0`
`LIKE string`	corresponds to the string *string*	`Name LIKE 'Motor*'`
`NOT LIKE string`	does not correspond to the string *string*	`Name NOT LIKE 'Valve*'`
`IN (v1, v2, …)`	corresponds to one or more values	`State IN (1, 4, 7)`
`NOT IN (v1, v2, …)`	does not correspond to one or more values	`State NOT IN (0, 2, 3, 5, 6)`
`(…)`	brackets expressions	`Value <= 75.0 AND (State = 1 OR State = 3)`

Precedence of the operators:

Rank	Operators
1	• Relational operators: =, <>, >, <, >=, <= • LIKE • IN • BETWEEN
2	NOT
3	AND, &&
4	OR, ||

Permitted wildcards:

Wildcard	Description	Example
*	Replaces 0 to more characters	`Name LIKE 'Motor*'` `Reference = <1.*.15>1`
?	Replaces 1 character	`Name = 'Recipe?'`