

# **HAMPEL SOFTWARE ENGINEERING**

**hse-libraries**

**HAMPEL SOFTWARE ENGINEERING**

**Version 3.6.0 (2022-10-26)**

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Document generated automatically!

This document was created fully automated from the actual LabVIEW Source Code of this project using the [Release Automation Tools](#) of [Hampel Software Engineering](#).

The Release Automation Tools (RAT) help automate the validating, testing, documenting, building, packaging and publishing of your projects. Built-in support for Git lets you trigger our tools from your repository, via GitLab CI/CD or Azure DevOps amongst others.

For a more detailed overview of what these tools do, see <https://rat.hampel-soft.com/>, where you can find information on the available tools, how we automate them using GitLab CI, when the next scheduled webinars are on, and how you can run those tools on your own servers using a commercial license for RAT.

# 1. STATE MACHINES



No state machines found.

HSE offers a robust, parsable, free open-source State Machine Template! You can find out more about it at <https://dokuwiki.hampel-soft.com/code/dqmh/hse-module-templates/state-machine>.

## 2. CALLING DEPENDENCY DIAGRAMS

### 2.1. OVERVIEW

No elements found.

### 2.2. CALLERS

No elements found.

### 2.3. LISTENERS

No elements found.

# APPENDIX A: DQMH

DQMH modules documentation

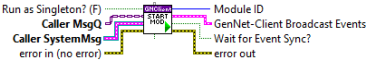
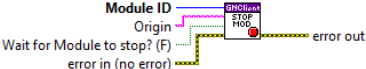
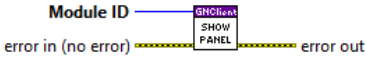
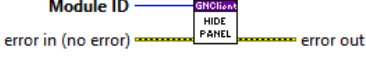
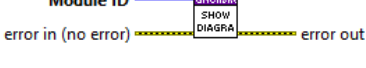
## A.1. GENNET-CLIENT.LVLIB


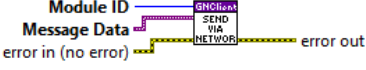



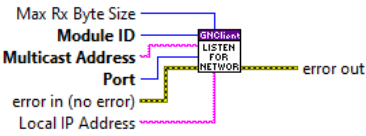

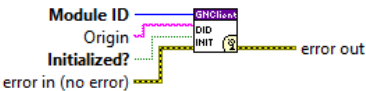

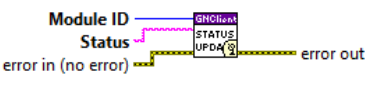

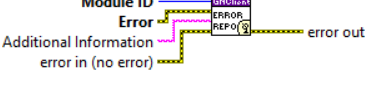




**Type:** Cloneable


**Responsibility:** No description found (add content in DQMH module lvlib description)

### A.1.1. EVENT LIST

Table 1. Events

Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			
Stop Module			<p>Send the Stop request to the Module's Main.vi. If <b>&lt;b&gt;Wait for Module to stop?&lt;/b&gt;</b> is TRUE, then this VI will not complete execution until the Module Main VI has stopped running.</p> <p><b>&lt;b&gt;Note:&lt;/b&gt;</b> If the cloneable module is running as singleton, then the 'Wait for Module to stop?' input is ignored... this VI will <b>&lt;b&gt;always&lt;/b&gt;</b> wait until a cloneable Main VI running as singleton has stopped running.</p> <p><b>&lt;b&gt;Note:&lt;/b&gt;</b> This VI was modified by the <b>&lt;b&gt;Validate DQMH Module&lt;/b&gt;</b> tool to upgrade it to the DQMH 5.1 approach to poll the execution state of a cloneable module running as singleton to know when the module has gone idle.</p> <p><b>&lt;b&gt;Note:&lt;/b&gt;</b> This VI was modified by the <b>&lt;b&gt;Validate DQMH Module&lt;/b&gt;</b> tool to upgrade it to the DQMH 5.0 approach to destroying cloneable module event references.</p>			
Show Panel	→		Send the Show Panel request to the Module's Main.vi.			
Hide Panel	→		Send the Hide Panel request to the Module's Main.vi.			
Show Diagram	→		This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			

Name	Type	Connector pane	Description	S.	R.	I.
Send via Network		 <p>Module ID Message Data error in (no error) error out</p>	Forwards the message of a DQMH module via Network			
Connect		 <p>Module ID error in (no error) timed out? error out</p>	Open the TCP/IP connection to the listening module			
Listen for Network Broadcasts		 <p>Max Rx Byte Size Module ID Multicast Address Port error in (no error) Local IP Address error out</p>	Opens a port to listen for broadcasts sent by other modules via UDP			
Module Did Init		 <p>Module ID Origin Initialized? error in (no error) error out</p>	Send the Module Did Init event to any VI registered to listen to this module's broadcast events.			
Status Updated		 <p>Module ID Status error in (no error) error out</p>	Send the Status Updated event to any VI registered to listen to events from the owning module.			
Error Reported		 <p>Module ID Error Additional Information error in (no error) error out</p>	Send the Error Reported event to any VI registered to listen to events from the owning module.			
Module Did Stop		 <p>Module ID Origin error in (no error) error out</p>	Send the Module Did Stop event to any VI registered to listen to this module's broadcast events.			
Update Module Execution Status		 <p>Module ID Running? error in (no error) error out</p>	Fire the Get Module Execution Status request.			

**Type:**  → Request |  → Request and Wait for Reply |  → Broadcast

**Scope:**  → Protected |  → Community

**Reentrancy:**  → Preallocated reentrancy |  → Shared reentrancy

**Inlining:**  → Inlined

## A.1.2. MODULE RELATIONSHIP



Table 2. Requests callers

Request Name	Callers
Connect	Test GenNet-Client API.vi hse-gennet.lvlib:GenNet Init Client.vi
Hide Panel	GenNet-Client.lvlib:Main.vi Test GenNet-Client API.vi
Listen for Network Broadcasts	Test GenNet-Client API.vi
Send via Network	Test GenNet-Client API.vi
Show Diagram	Test GenNet-Client API.vi
Show Panel	Test GenNet-Client API.vi

Table 3. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test GenNet-Client API.vi
Module Did Init	Test GenNet-Client API.vi
Module Did Stop	Test GenNet-Client API.vi
Status Updated	Test GenNet-Client API.vi
Update Module Execution Status	Test GenNet-Client API.vi

Table 4. Used requests

Module	Requests
GenNet-Client.lvlib	Hide Panel.vi Stop Module.vi

Table 5. Registered broadcast

Module	Broadcasts
☒—☒	☒—☒

### A.1.3. MODULE START/STOP CALLS

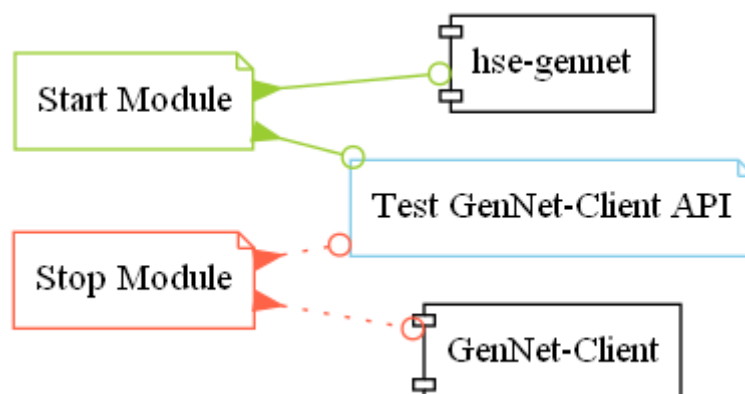


Table 6. Start and Stop module callers

Function	Callers
Start Module	Test GenNet-Client API.vi hse-gennet.lvlib:GenNet Init Client.vi



Function	Callers
Stop Module	GenNet-Client.lvlib:Handle Exit.vi Test GenNet-Client API.vi

## A.1.4. MODULE CUSTOM ERRORS



Custom errors are added to the module via vi named `*--error.vi`.

Module GenNet-Client.lvlib use the following custom errors:

Table 7. Custom errors

Name	Code	Description
Module Running as Singleton	403680	The "%s" module is currently running as singleton, but the Start Module VI was called with 'Run as Singleton' specified as FALSE.
Module Not Stopped	403682	%s Module did not finish clean up on exit.
Module Not Synced	403683	%s Module was unable to synchronize events.
Module Not Running	403684	Not a single instance of "%s" Module running.
Module Running as Cloneable	403685	The "%s" module is currently running as cloneable, but the Start Module VI was called with 'Run as Singleton' specified as TRUE.
Request Timed Out	403686	The reply for the request "%s" of the "%s" Module timed out.
Request and Wait for Reply Timeout	403686	%s
Master Reference Not Closed	403687	The "%s" module cannot be run as singleton because the Master Reference is still open from a prior run as cloneable. If you plan on running this module as both singleton and cloneable, consider changing your Main VI to wire a value of TRUE to the 'Close Master Reference' input of Init Module.vi.

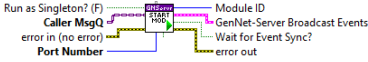
## A.2. GENNET-SERVER.LVLIB

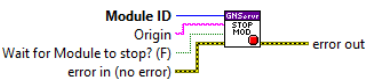
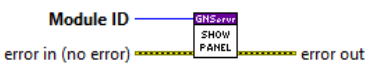
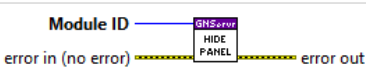
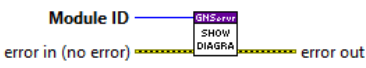
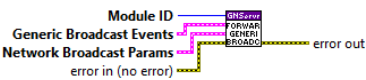
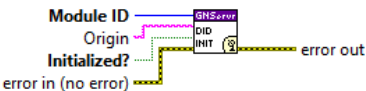
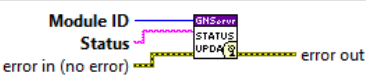
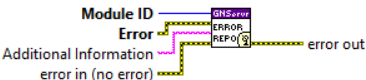
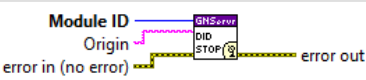
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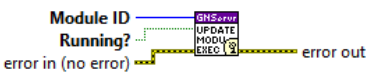


**Responsibility:** No description found (add content in DQMH module lvlib description)

### A.2.1. EVENT LIST

Table 8. Events



Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			

Name	Type	Connector pane	Description	S.	R.	I.
Stop Module			<p>Send the Stop request to the Module's Main.vi. If <b>&lt;b&gt;Wait for Module to stop?&lt;/b&gt;</b> is TRUE, then this VI will not complete execution until the Module Main VI has stopped running.</p> <p><b>&lt;b&gt;Note:&lt;/b&gt;</b> If the cloneable module is running as singleton, then the 'Wait for Module to stop?' input is ignored... this VI will <b>&lt;b&gt;always&lt;/b&gt;</b> wait until a cloneable Main VI running as singleton has stopped running.</p> <p><b>&lt;b&gt;Note:&lt;/b&gt;</b> This VI was modified by the <b>&lt;b&gt;Validate DQMH Module&lt;/b&gt;</b> tool to upgrade it to the DQMH 5.1 approach to poll the execution state of a cloneable module running as singleton to know when the module has gone idle.</p> <p><b>&lt;b&gt;Note:&lt;/b&gt;</b> This VI was modified by the <b>&lt;b&gt;Validate DQMH Module&lt;/b&gt;</b> tool to upgrade it to the DQMH 5.0 approach to destroying cloneable module event references.</p>			
Show Panel	→		Send the Show Panel request to the Module's Main.vi.			
Hide Panel	→		Send the Hide Panel request to the Module's Main.vi.			
Show Diagram	→		This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			
Forward Generic Broadcasts to Network	→		Enables forwarding of the callers <b>&lt;b&gt;Generic Broadcast Events&lt;/b&gt;</b> to the network via UDP as set in the <b>&lt;b&gt;Network Broadcast Params&lt;/b&gt;</b> .			
Module Did Init	→		Send the Module Did Init event to any VI registered to listen to this module's broadcast events.			
Status Updated	→		Send the Status Updated event to any VI registered to listen to events from the owning module.			
Error Reported	→		Send the Error Reported event to any VI registered to listen to events from the owning module.			
Module Did Stop	→		Send the Module Did Stop event to any VI registered to listen to this module's broadcast events.			

Name	Type	Connector pane	Description	S.	R.	I.
Update Module Execution Status			Fire the Get Module Execution Status request.			
GenNet Message Received			Broadcasts a received <b>&lt;b&gt;message&lt;/b&gt;</b> as variant datatype. The actual datatype (and decoding) of the variant depends on the GenNet Protocol being used.			

**Type:**  → Request |  → Request and Wait for Reply |  → Broadcast

**Scope:**  → Protected |  → Community

**Reentrancy:**  → Preallocated reentrancy |  → Shared reentrancy

**Inlining:**  → Inlined

## A.2.2. MODULE RELATIONSHIP



Table 9. Requests callers

Request Name	Callers
Forward Generic Broadcasts to Network	Test GenNet-Server API.vi
Hide Panel	Test GenNet-Server API.vi
Show Diagram	Test GenNet-Server API.vi
Show Panel	Test GenNet-Server API.vi

Table 10. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test GenNet-Server API.vi
GenNet Message Received	Test GenNet-Server API.vi
Module Did Init	Test GenNet-Server API.vi
Module Did Stop	Test GenNet-Server API.vi
Status Updated	Test GenNet-Server API.vi
Update Module Execution Status	Test GenNet-Server API.vi

Table 11. Used requests

Module	Requests
GenNet-Server.lvlib	Stop Module.vi (3)

Table 12. Registered broadcast

Module	Broadcasts
☒—☒	☒—☒

### A.2.3. MODULE START/STOP CALLS

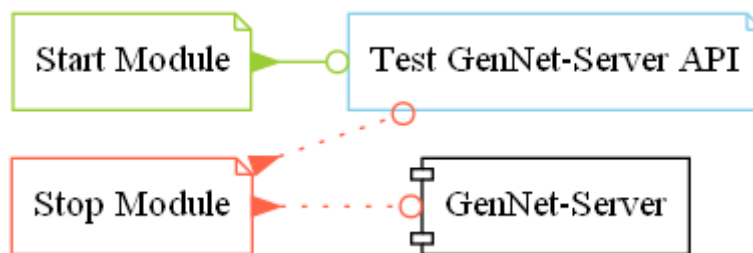


Table 13. Start and Stop module callers

Function	Callers
Start Module	Test GenNet-Server API.vi
Stop Module	GenNet-Server.lvlib:Main.vi GenNet-Server.lvlib:Handle Exit.vi Test GenNet-Server API.vi

### A.2.4. MODULE CUSTOM ERRORS



Custom errors are added to the module via vi named `*--error.vi`.

Module GenNet-Server.lvlib use the following custom errors:

Table 14. Custom errors

Name	Code	Description
Module Running as Singleton	403680	The "%s" module is currently running as singleton, but the Start Module VI was called with 'Run as Singleton' specified as FALSE.
Module Not Stopped	403682	%s Module did not finish clean up on exit.
Module Not Synced	403683	%s Module was unable to synchronize events.
Module Not Running	403684	Not a single instance of "%s" Module running.
Module Running as Cloneable	403685	The "%s" module is currently running as cloneable, but the Start Module VI was called with 'Run as Singleton' specified as TRUE.
Request and Wait for Reply Timeout	403686	%s
Master Reference Not Closed	403687	The "%s" module cannot be run as singleton because the Master Reference is still open from a prior run as cloneable. If you plan on running this module as both singleton and cloneable, consider changing your Main VI to wire a value of TRUE to the 'Close Master Reference' input of Init Module.vi.

# APPENDIX B: LIBRARIES

Misc. reuse libraries

## B.1. HSE-CONFIG.LVLIB

**Responsibility:** No description found (add content in lvlib description)

**Version:** 1.0.0.0

Table 15. Nested libraries

Name	Type
[config-base.lvclass]	LVClass
[config-ini.lvclass]	LVClass

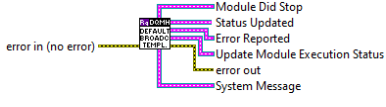
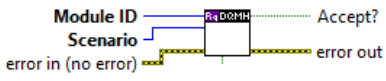
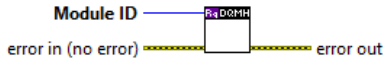
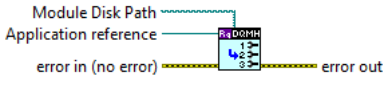
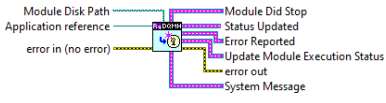
This library has no functions set to non private scope.

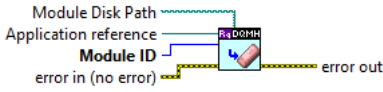
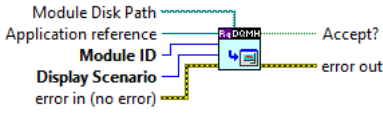
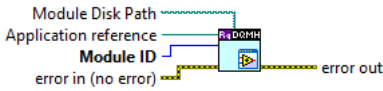
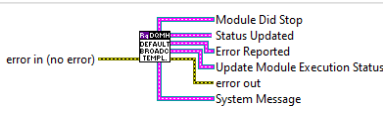
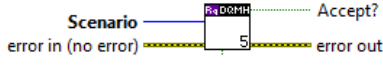

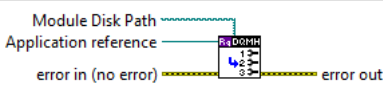
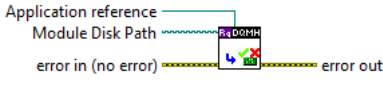
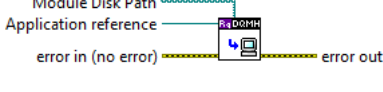
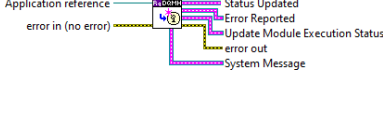
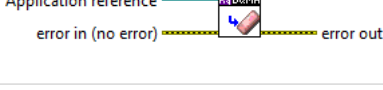
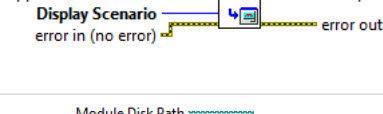
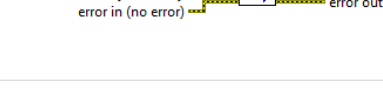
## B.2. HSE-DQMH-DYNAMICREQUESTERS.LVLIB

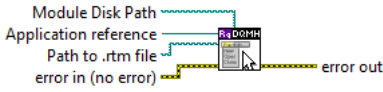
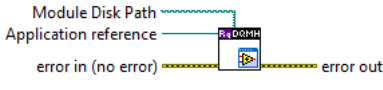
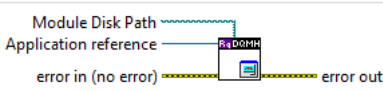
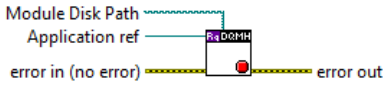
**Responsibility:** No description found (add content in lvlib description)

**Version:** 1.0.0.0



Table 16. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Default Broadcast (Cloneable)--template					
Request UI Display (Cloneable)--template		No description found (add content in vi description)			
Show Diagram (Cloneable)--template		No description found (add content in vi description)			
DQMH Configure (Cloneable)		Calls the "Configure" request VI of the module in <b>path</b>			
DQMH Obtain Default Broadcast Events (Cloneable)		Calls the "Obtain Default Broadcast Events" request VI of the module in <b>path</b>			

Name	Connector pane	Description	S.	R.	I.
DQMH Prepare (Cloneable)		Calls the "Prepare" request VI of the module in <b>&lt;b&gt;path&lt;/b&gt;</b>			
DQMH Request UI Display (Cloneable)		Calls the "Request UI Display" request VI of the module in <b>&lt;b&gt;Path to module directory&lt;/b&gt;</b> . Hands over the <b>&lt;b&gt;Module ID&lt;/b&gt;</b> and the <b>&lt;b&gt;Display Scenario&lt;/b&gt;</b> .			
DQMH Show Diagram (Cloneable)		Calls the "Request UI Display" request VI of the module in <b>&lt;b&gt;Path to module directory&lt;/b&gt;</b> . Hands over the <b>&lt;b&gt;Module ID&lt;/b&gt;</b> and the <b>&lt;b&gt;Display Scenario&lt;/b&gt;</b> .			
Default Broadcast—template					
Request UI Display—template		No description found (add content in vi description)			
Set Modules—template		No description found (add content in vi description)			
DQMH Configure		Calls the "Configure" request VI of the module in <b>&lt;b&gt;path&lt;/b&gt;</b>			
DQMH Load API Tester		Calls the "Load Module" request VI of the module in <b>&lt;b&gt;path&lt;/b&gt;</b>			
DQMH Load Module		Calls the "Load Module" request VI of the module in <b>&lt;b&gt;path&lt;/b&gt;</b>			
DQMH Obtain Default Broadcast Events		Calls the "Obtain Default Broadcast Events" request VI of the module in <b>&lt;b&gt;path&lt;/b&gt;</b>			
DQMH Prepare		Calls the "Prepare" request VI of the module in <b>&lt;b&gt;path&lt;/b&gt;</b>			
DQMH Request UI Display		Calls the "Request UI Display" request VI of the module in <b>&lt;b&gt;Path to module directory&lt;/b&gt;</b> . Hands over the <b>&lt;b&gt;Module Name&lt;/b&gt;</b> and the <b>&lt;b&gt;Display Scenario&lt;/b&gt;</b> .			
DQMH Set Modules		Calls the "Set Modules" request VI of the module in <b>&lt;b&gt;Path to module directory&lt;/b&gt;</b> . Hands over paths to all dynamically loaded modules in <b>&lt;b&gt;modules to load dynamically&lt;/b&gt;</b> .			

Name	Connector pane	Description	S.	R.	I.
DQMH Set Runtime Menu		Calls the "Set Runtime Menu" request VI of the module in <b>Path to module directory</b>. Hands over the <b>Path to .rtm file</b>.			
DQMH Show Diagram		Calls the "Request UI Display" request VI of the module in <b>Path to module directory</b>. Hands over the <b>Module Name</b> and the <b>Display Scenario</b>.			
DQMH Show Panel		Calls the "Show Panel" request VI of the module in <b>Path to module directory</b>.			
DQMH Stop Module		Calls the "Stop Module" request VI of the module in <b>Path to module directory</b>.			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

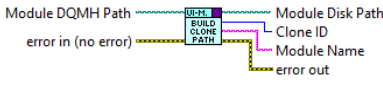
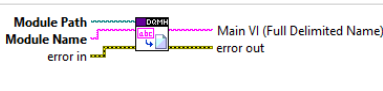

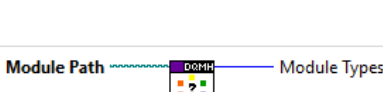

Inlining:  → Inlined

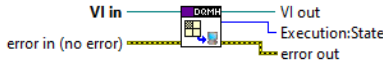

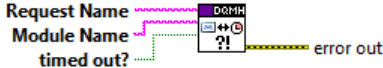

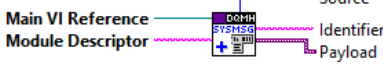

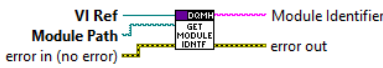

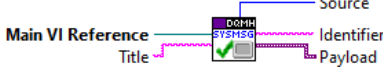

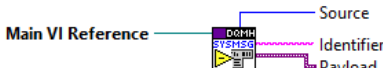




## B.3. HSE-DQMH.LVLIB

**Responsibility:** No description found (add content in lplib description)


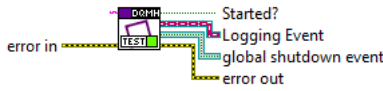
**Version:** 1.0.0.0

Table 17. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
DQMH Build Module Disk Path From DQMH Path		Parses the Instance Name for the Clone ID and returns the full path to the module's directory, the Clone ID and the module's name			
DQMH Get Fully Delimited Instance Name from Module Name		Parses the fully delimited VI name from the module path and the module name. For cloneables, the clone ID is appended to the VI name.			
DQMH Get Module Type		Returns the type (singleton or cloneable) of the module in <b>Module Path</b>			

Name	Connector pane	Description	S.	R.	I.
DQMH Load Main VI Reference		<p>Loads the VI reference to a Singleton DQMH module's main.vi. On Linux RT in Runtime Environment, the main.vi is loaded reentrant in order to circumvent a bug in LabVIEW.</p> <p>Details: On Linux RT with Embedded UI enabled running a startup.exe, a VI server invoke method (Control Value.set) doesn't work. This is possibly related to / covered by CAR 514879 (see <a href="https://forums.ni.com/t5/Delacor-Toolkits-Discussions/Deploy-and-run-at-Startup-for-RT-systems/m-p/3620339/highlight/true#M256">https://forums.ni.com/t5/Delacor-Toolkits-Discussions/Deploy-and-run-at-Startup-for-RT-systems/m-p/3620339/highlight/true#M256</a>).</p> <p>In order for this VI to work, you need to: 1. set the DQMH module's main.vi execution setting to "preallocated clone reentrant execution" 2. set the DQMH module's main.vi scope to "community" 3. add the hse-dqmh.lvlib as a friend in the DQMH module's .lvlib Friends properties</p>			
DQMH Request Reply Timed Out—error		No description found (add content in vi description)			
DQMH System Message - Add to Run-Time Menu		Sends the modul's <b>Path</b> and <b>Module Descriptor</b> via the "Add to Run-Time Menu" System Message broadcast. The UI Manager inserts the module into the relevant locations in the run-time menu.			
DQMH System Message - Get Module Identifier		No description found (add content in vi description)			
DQMH System Message - Ready for Display		No description found (add content in vi description)			
DQMH System Message - Remove from Run-Time Menu		No description found (add content in vi description)			
DQMH System Message - Removed from Subpanel		No description found (add content in vi description)			
DQMH Tester Cleanup hse-appl		If the hse-application object was instantiated and the hse-logger was initialized when starting the Tester, this VI cleans up both objects.			



Name	Connector pane	Description	S.	R.	I.
DQMH Tester Prepare hse- appl - Get Name and Path		<p>Returns APP-NAME as Project Name and /APP-NAME_Source as Project Path</p> <p>HSE projects follow this folder structure: /APP-NAME_Config ..... Configuration Files /APP-NAME_Data ..... Measured and Other Data /APP-NAME_Source ..... LabVIEW Sources /APP-NAME ..... Compiled Application</p> <p>REAL-TIME: As the configuration directory on real-time systems always needs to reside at "C:\&lt;Project Name&gt;_Config\", and as it tedious (embedded UI) or impossible (no embedded UI) to enter the path, it can be supplied via the optional Real-Time App Name string input.</p>			
DQMH Tester Prepare hse- appl		<p>If the hse-application class is not running, queries the user for the path of the containing application and instantiates the hse-appl class. Returns if it did load the class.</p> <p>HSE projects follow this folder structure: /APP-NAME_Config ..... Configuration Files /APP-NAME_Data ..... Measured and Other Data /APP-NAME_Source ..... LabVIEW Sources /APP-NAME ..... Compiled Application</p> <p>The hse-application:ApplicationInit.VI expects the "APP-NAME_Source" folder and the "application name", and processes these to automatically find the "_Config" and "_Data" directories.</p> <p>REAL-TIME: As the configuration directory on real-time systems always needs to reside at "C:\&lt;Project Name&gt;_Config\", and as it tedious (embedded UI) or impossible (no embedded UI) to enter the path, it can be supplied via the optional Real-Time App Name string input.</p> <p>If this VI is used outside of the normal application scope (e.g. in a unit test with a separate LV project) you can provide the absolute path to the app source folder to "RT App Name or Path".</p>			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

## B.4. HSE-GENNET.LVLIB

**Responsibility:** The DQMH-GenNet library contains all support files necessary to use the HSE Generic Networking Singleton Module provided by HAMPEL SOFTWARE ENGINEERING.

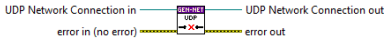


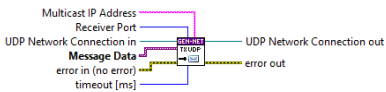


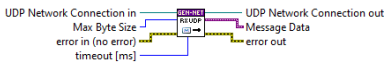











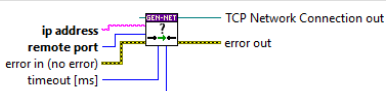


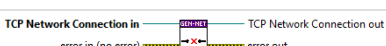

The Delacor Queued Message Handler (DQMH) reference design is provided by Delacor, an NI Alliance Partner. The DQMH is available for download from the LabVIEW Tools Network. You can find more information on the Delacor Queued Message Handler (DQMH) at <http://delacor.com/products/dqmh/>.



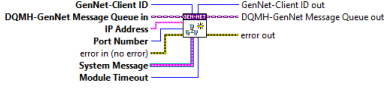

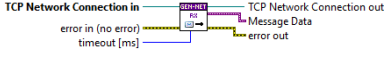


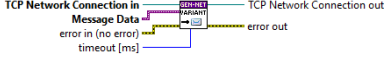





**Version:** 1.0.0.0

Table 18. Nested libraries

Name	Type
GenNet Protocol.lvclass	LVClass
GenNet Variant Protocol.lvclass	LVClass
DQMH-GenNet Message Queue.lvclass	LVClass

Table 19. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
GenNet Close UDP Connection		Closes a TCP/IP connection.			
GenNet Send UDP Message		Sends a message via TCP/IP to a GenNet-Server module.  The message is flattened to a string, and the length of the string is prepended before sending it over the network.			
GenNet Receive UDP Message		Receives a message sent by a GenNet-Client module. The first 4 bytes of the message contain the length of the actual data sent. The received message is converted to a variant.			
GenNet Get Broadcast Name From Variant		No description found (add content in vi description)			
GenNet Add Broadcast Name To Variant		No description found (add content in vi description)			
DQMH-GenNet Add Notifier To Variant		HSE: If a notifier reference is given, stores it as an attribute inside the Message Data variant. The notification data type is variant.			
DQMH-GenNet Get Notifier From Variant		HSE: Gets the Wait Notifier Refnum (datatype variant) from the Message Data variant			
GenNet Check Connection		Checks for a valid TCP/IP connection. Reestablishes the connection if no valid connection found. Creates a new connection if none was given.			
GenNet Close Connection		Closes a TCP/IP connection.			

Name	Connector pane	Description	S.	R.	I.
GenNet Format System Message for MsgQ		Formats the contents of a System Message			
GenNet Init Client		Initializes a GenNet Client if <B>ClientID == -1</B> and automatically connects to it. See usage example inside for how to use this VI.			
GenNet Receive Variant Message		Receives a message sent by a GenNet-Client module. The first 4 bytes of the message contain the length of the actual data sent. The received message is converted to a variant.			
GenNet Send Message		Sends a message via TCP/IP to a GenNet-Server module.  The message is flattened to a string, and the length of the string is prepended before sending it over the network.			
GenNet Version-Safe Unflatten Variant		Unflattens a variant from a string. Automatically prepends the correct header if the variant was flattened in another LabVIEW version.			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

## B.5. HSE-MISC.LVLIB



**Responsibility:** source code password: bowman-tyro-kickback-besides

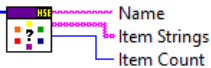











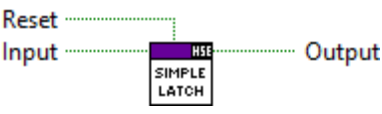


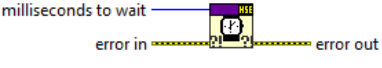



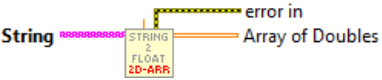

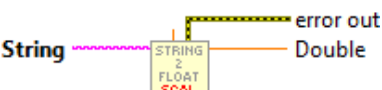



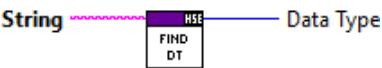
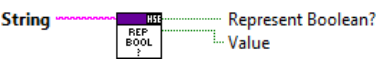


**Version:** 1.0.0.0

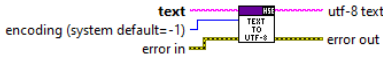


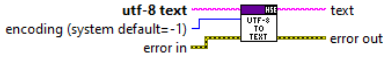












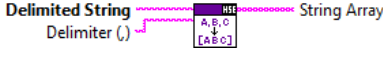
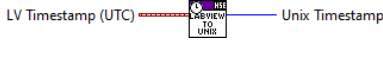








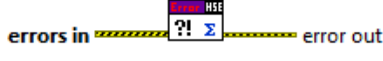





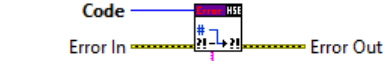

Table 20. Nested libraries

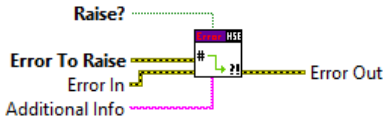
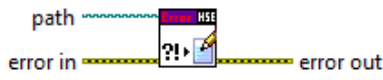
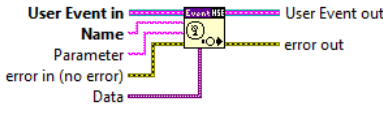

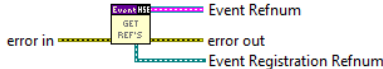




Name	Type
Loop Timer.lvclass	LVClass




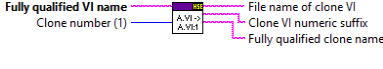




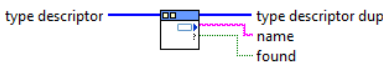


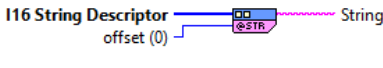


Table 21. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
ColorCycle		<p>With every call, this VI returns a color from a color pallet. If the last color from a pallet is reached, the VI continues with the first color.</p> <p>This Vi is useful to give plots and graphs better looking colors.</p> <p>The color sets are inspired by a subset of the colormaps from the Python plotting library Matplotlib.</p>			

Name	Connector pane	Description	S.	R.	I.
Get Enum Details from Type String		No description found (add content in vi description)			
Get Multiple Attributes from Variant		No description found (add content in vi description)			
Graph Scale Axis		Calculates usefull values for the Graph scaling (Minimum, Maximum) that go 10% over the min/max-values and include zero.			
Set Multiple Attributes to Variant		Set multiple attributes (key-values-pairs) to a variant.			
Simple Edge Detection (Falling)		Returns True if a falling edge (True -> False) occures.  (This VI is inlined.)			
Simple Edge Detection (Rising)		Returns True if a rising edge (False -> True) occures.  (This VI is inlined.)			
Simple Latch		A simple boolean latch with reset functionality.			
Wait_ErrorCluster		Simple wrapper for the Wait function that allows for data flow.			
ConvertStringToFloat_Array-1D		converts array of string values to floating point values			
ConvertStringToFloat_Array-2D		converts array of string values to floating point values			
ConvertStringToFloat_Scalar		converts single string value to floating point value			
Filename Sanitizer		Removes all characters that are not supported in filenames (/ \ : * ? " < >   ) and replaces it with "Replace String" (default is "_").			
Find Data Type		No description found (add content in vi description)			
Represent Boolean		No description found (add content in vi description)			

Name	Connector pane	Description	S.	R.	I.
Text to UTF-8 Wrapper		Converts LabVIEW text to UTF-8.			
UTF-8 to Text Wrapper		Converts UTF-8 text to text encoded in the specified system.			
U8-Array to U64		Convert an array of Bytes (U8) to an array of U64.			
U64-Array to U8		Convert an array of U64 to an array of Bytes (U8).			
Variant_BuildClusterFromElementArray		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin ( <a href="https://github.com/LabVIEW-Open-Source/DataManipulation">https://github.com/LabVIEW-Open-Source/DataManipulation</a> ).			
Variant_EmptyCluster		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin ( <a href="https://github.com/LabVIEW-Open-Source/DataManipulation">https://github.com/LabVIEW-Open-Source/DataManipulation</a> ).			
Delimited String to 1D Array		Converts a delimited string (e.g. "A, B, C") to an 1D array of strings (e.g. ["A", "B", "C"]). Removes whitespace around the elements.			
LV Timestamp to Unix Epoch		Convert a LabView Timestamp (UTC Timezone) to a Unix Epoch Timestamp (C time_t).			
Seconds to Time		Convert a time range (in seconds) to a time string in the format "hh:mm:ss". E.g. 3680s -> "01:01:20".			
Unix Epoch to LV Timestamp		Convert a Unix Epoch Timestamp (C time_t) to a LabView Timestamp (UTC Timezone).			
Error_AddAdditionalInformation		Adds <b>Additional Info</b> to the source of <b>Error In</b>			
Error_AppendErrorsToSource		Takes the first element of <b>errors in</b> and concatenates all other elements' code and source into the source of the first error.			
Error_Clear		Clears the error in <b>error in</b>			
Error_Helper_BuildCluster		Builds an error cluster from <b>Code</b> and <b>Additional Info</b>			
Error_Helper_OverwriteCluster		If <b>Error In</b> is true, overwrites the error cluster information with <b>Code</b> and <b>Additional Info</b>.			

Name	Connector pane	Description	S.	R.	I.
Error_Helper_RaiseError		If <b>Raise?</b> is true, puts the error in <b>Error To Raise</b> on the error output and adds <b>Additional Info</b> to the source of the error.			
Error_Helper_RaiseErrorFromLabel		If <b>Raise?</b> is true, sets an error with code set by <b>Error Labels</b> and source by <b>Additional Info</b>			
Error_LogToFile		If <b>error in</b> is true, writes the error to the file identified by <b>path</b> and clears the error.			
Event_CloseRegistrationRef		Unregisters the given event registration from the HSE-Event			
Event_Generate		Generates an HSE-Event and sends <b>Name</b> , <b>Parameter</b> and <b>Data</b> as event data.			
Event_GetRefAndReg		Gets the HSE-Event refnum and a new event registration refnum for it.			
Event_LoadOrCreateRefs		Returns the refnum of the HSE-Event			
Hash Core					
Hash					
Delete Duplicates From 1D-Array (String)		(v0.2.1b; 2017-08-14 16:44)			
Sort 2D-Array		Sorts a 2D string array by the column declared in <b>Search parameters</b> and by <b>Sort Order</b> .			
String_PadWithCharacters		Adds <b>char (ASCII)</b> characters to <b>str in</b> until it is <b>length</b> characters long.  Common ASCII characters: 0x09 ... tab 0x20 ... space 0x2E ... dot (.)			

Name	Connector pane	Description	S.	R.	I.
String_StripNullValues		Removes all NULL values from a string			
Search for App Source Folder		Search for the application source folder down the folder hierarchy, starting at the current project path. Finds the app source folder if it is in one of the folders down the hierarchy (e.g. when using the hse project structure).			
Generate Clone Name		<p>Given the fully qualified name of a VI (meaning the name includes any library namespace prefixes), this VI returns the name of a clone of the VI. By default, it returns the name of the first clone that gets created, but you can request the Nth clone by supplying the "Clone number" input.</p> <p>USE WITH CAUTION. The name returned by this VI can be used with the "Open VI Reference" function to open a VI reference to a clone VI. This is an unsupported feature of LabVIEW (i.e. opening an additional reference to a clone VI was never intended to work but someone forgot to disable it when clones were added to LabVIEW). Opening extra references beyond the one used to create the clone (i.e. the clone's "this VI" reference) is known to cause instabilities, including crashes, in some situations. However, such refnums are critical for writing certain debugging tools. Be careful.</p>			
ShowRunningVIs		Returns a list of VIs in memory			
StringLogger		Simple helper VI for writing data to a log file. <b>Path Data</b> and <b>Label</b> form the folder structure, and <b>Function</b> is part of the file name.			
TypeDescriptor_GetName		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin ( <a href="https://github.com/LabVIEW-Open-Source/DataManipulation">https://github.com/LabVIEW-Open-Source/DataManipulation</a> ).			
TypeDescriptor_GetPString		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin ( <a href="https://github.com/LabVIEW-Open-Source/DataManipulation">https://github.com/LabVIEW-Open-Source/DataManipulation</a> ).			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

## B.6. HSE-NETWORK.LVLIB

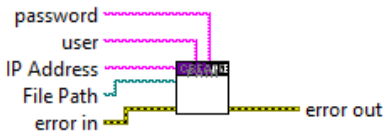

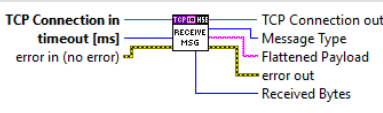


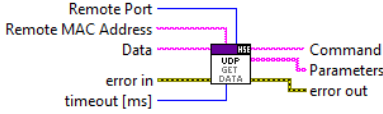
**Responsibility:** No description found (add content in lvlib description)

**Version:** 1.0.0.0



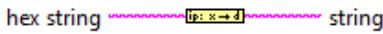
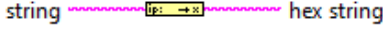


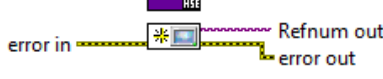
Table 22. Nested libraries

Name	Type
NetStream.lvclass	LVClass

Table 23. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
FTP_CreateRemotePath	 <p>password user IP Address File Path error in error out</p>				
FTP_RemoveRemoteFile	 <p>password user IP Address File Path error in error out</p>				
TCP Receive Message	 <p>TCP Connection in timeout [ms] error in (no error) TCP Connection out Message Type Flattened Payload error out Received Bytes</p>				
TCP Send Message	 <p>Connection ID TCP-Message in Timeout (ms) error in Connection ID out Bytes written error out</p>	Send a message (measurement data, command, ...) via TCP. The message must be flattened to a string and the message typ is determined by the "Message Type Enum".			
UDP__ReceiveDataViaSystemEvent	[hse-network.lvlib:UDP</em>ReceiveDataViaSystemEvent.vi]				
UDP__Send	[hse-network.lvlib:UDP</em>Send.vi]				
UDP__TransmitData	[hse-network.lvlib:UDP</em>TransmitData.vi]				
UDP_GetDataFromDevice	 <p>Remote Port Remote MAC Address Data error in timeout [ms] Command Parameters error out</p>				



Name	Connector pane	Description	S.	R.	I.
UDP_SendData					
COM_ParseCommand		(v0.2.1b; 2017-08-14 16:44)			
GetNetworkInfo		(v0.2.1b; 2017-08-14 16:44)			
IP_CheckIfValid		Check if the string input is a valid IP address			
IP_ToDecimalString		(v0.2.1b; 2017-08-14 16:44)			
IP_ToHexString		(v0.2.1b; 2017-08-14 16:44)			
MAC_ColonToHex		(v0.2.1b; 2017-08-14 16:44)			
MAC_HexToColon		(v0.2.1b; 2017-08-14 16:44)			
MAC_ToHexString		(v0.2.1b; 2017-08-14 16:44)			
SystemConfigSession		(v0.2.1b; 2017-08-14 16:44)			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy


Inlining:  → Inlined

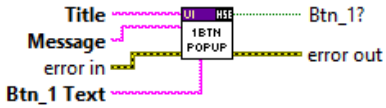


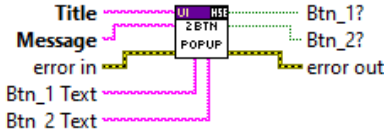
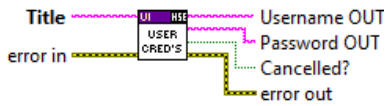

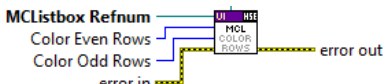
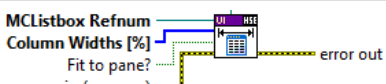
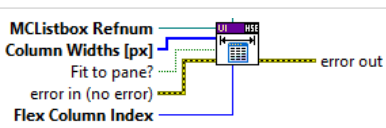
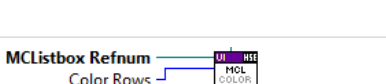


## B.7. HSE-UI.LVLIB

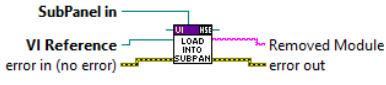
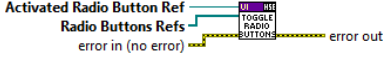
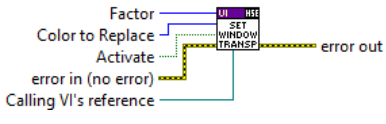

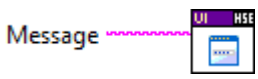
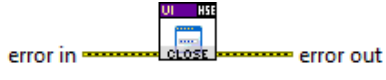


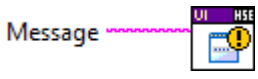

**Responsibility:** No description found (add content in lvlib description)

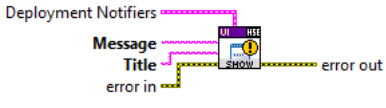



**Version:** 1.0.0.0

Table 24. Functions (non private scope only)


Name	Connector pane	Description	S.	R.	I.
Dialogue_Error		Shows a dialog window for displaying an error message.			

Name	Connector pane	Description	S.	R.	I.
Dialogue_OneButton		Shows a dialog window with a message and an OK button			
Dialogue_Password		Shows a dialog window for entering a password.			
Dialogue_String		Shows a dialog window for entering a string value.			
Dialogue_TwoButton		Shows a dialog window with a message and two buttons (default: "Ok" and "Cancel")			
Dialogue_UserCredentials		Shows a dialog window for entering user credentials (username and password).			
FPControl					
MultiColumnListBox_ColorRows		Colors the rows of a MCLB in alternate colors. If <b>&lt;b&gt;Parent VI Reference&lt;/b&gt;</b> is supplied, panel updates are deferred.			
MultiColumnListBox_Resize		Resizes the columns of a MCLB according to the widths given in <b>&lt;b&gt;Column Widths [%]&lt;/b&gt;</b> . If <b>&lt;b&gt;Parent VI Reference&lt;/b&gt;</b> is supplied, panel updates are deferred.			
MultiColumnListBox_Resize_Absolute		Resizes the columns of a MCLB according to the widths given in <b>&lt;b&gt;Column Widths [px]&lt;/b&gt;</b> . The column with the index in <b>&lt;b&gt;Flex Column Index&lt;/b&gt;</b> uses the remaining space. If <b>&lt;b&gt;Parent VI Reference&lt;/b&gt;</b> is supplied, panel updates are deferred.			
MultiColumnListBox_UnColorRows		Colors the rows of a MCLB in alternate colors. If <b>&lt;b&gt;Parent VI Reference&lt;/b&gt;</b> is supplied, panel updates are deferred.			
PanelUpdates_Defer					
PanelUpdates_Enable					

Name	Connector pane	Description	S.	R.	I.
Subpanel - Load VI	 <p>SubPanel in VI Reference error in (no error)</p> <p>Removed Module error out</p>	<p>Opens the VI reference to &lt;b&gt;Full Delimited Name&lt;/b&gt; and inserts it into &lt;b&gt;SubPanel in&lt;/b&gt;. The reference of the inserted VI is returned in Subpanel VI Ref OUT.</p> <p>If Subpanel VI Ref IN is a valid reference, the front panel of the referenced VI is opened hidden before removing it from the subpanel in order to avoid losing the VI from memory.</p>			
Toggle Radio Buttons	 <p>Activated Radio Button Ref Radio Buttons Refs error in (no error)</p> <p>error out</p>	No description found (add content in vi description)			
Window Color to Transparent	 <p>Factor Color to Replace Activate error in (no error) Calling VI's reference</p> <p>error out</p>				
Window Handle	 <p>window name ("") error in (no error)</p> <p>hWnd error out</p>	<p>This VI will use the FindWindow API function to retrieve a window refnum for the window identified by window name. 'window name' is the text appearing in the title bar of a window. If the window cannot be found, the window refnum out will be 'Not a Window Refnum', and an error will occur.</p>			
ProgressPopup	 <p>Message</p>				
ProgressPopup_Close	 <p>error in</p> <p>error out</p>	Closes the modal progress window.			
ProgressPopup_Show	 <p>Message Title error in</p> <p>error out</p>	<p>Shows a modal window with an animated progress bar, indicating that some (background) process is running.</p> <p>The &lt;b&gt;Title&lt;/b&gt; of the window and the &lt;b&gt;Message&lt;/b&gt; being displayed can be specified.</p>			
ProgressPopup_Update	 <p>Message error in</p> <p>error out</p>	Closes the modal progress window.			
ProgressPopup_WithStatus	 <p>Message</p>				
ProgressPopup_WithStatus_Close	 <p>error in</p> <p>error out</p>	Closes the modal progress window.			

Name	Connector pane	Description	S.	R.	I.
ProgressPopup WithStatus_Sh ow		<p>Shows a modal window with an animated progress bar, indicating that some (background) process is running.</p> <p>The <b>Title</b> of the window and the <b>Message</b> being displayed can be specified.</p>			
HSE_AboutScr een					
Screen_ShowH seAbout					
Screen_ShowP rojectAbout					

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

# APPENDIX C: CLASSES

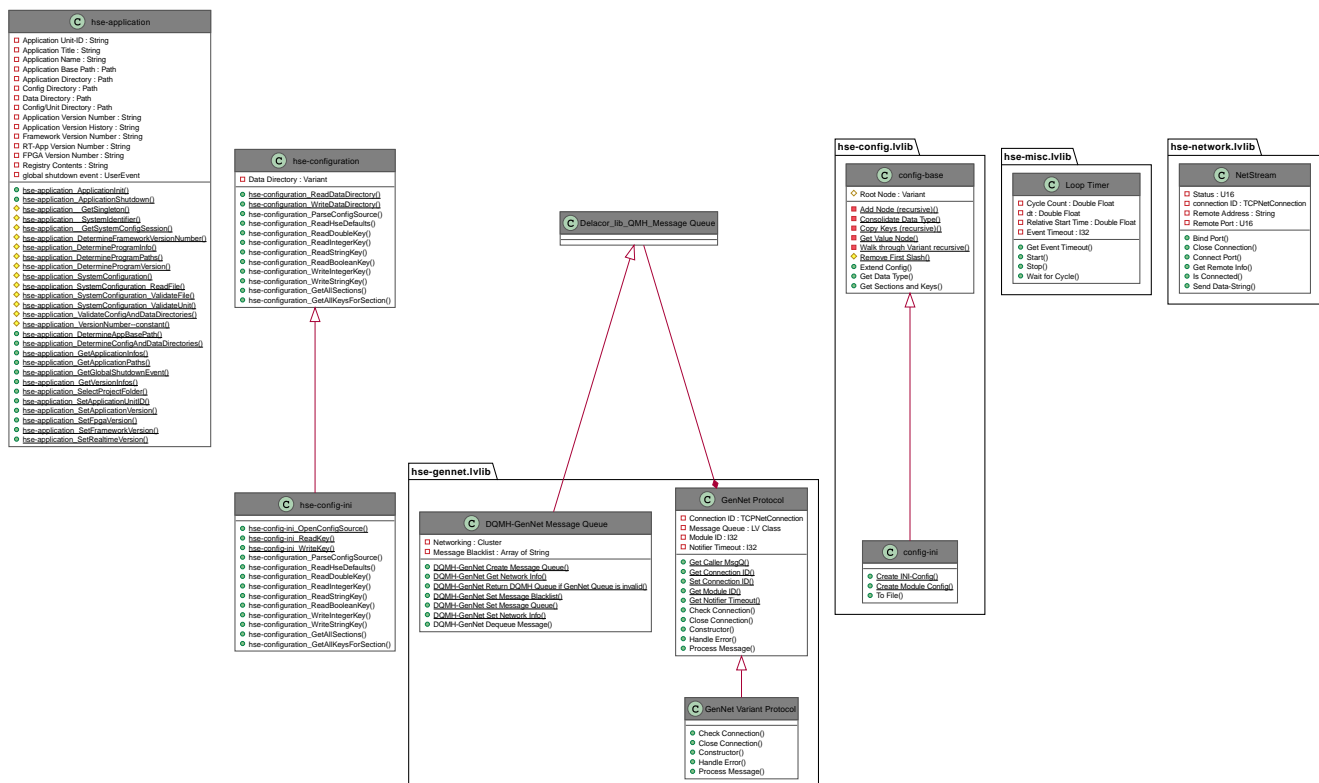
## LabVIEW Classes

### C.1. CLASSES OVERVIEW

This project contains 10 classes and 0 interface.

Table 25. Classes list

Classes	Interfaces
[hse-application.lvclass]	
[hse-config-ini.lvclass]	
[hse-configuration.lvclass]	
[config-base.lvclass]	
[config-ini.lvclass]	
GenNet Protocol.lvclass	
GenNet Variant Protocol.lvclass	
DQMH-GenNet Message Queue.lvclass	
Loop Timer.lvclass	
NetStream.lvclass	




## C.2. HSE-APPLICATION.LVCLASS





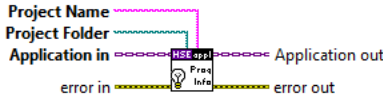










**Responsibility:** No description found (add content in lvclass description)



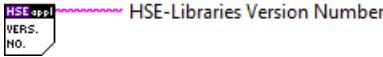


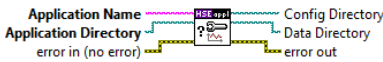
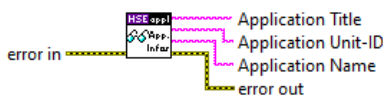


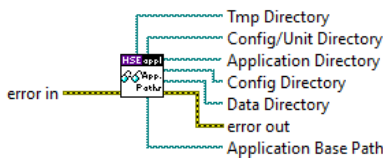





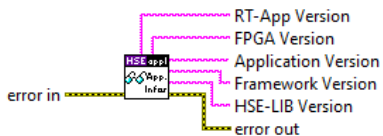

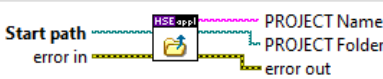
**Version:** 1.0.0.4

C hse-application
<ul style="list-style-type: none"> <li>□ Application Unit-ID : String</li> <li>□ Application Title : String</li> <li>□ Application Name : String</li> <li>□ Application Base Path : Path</li> <li>□ Application Directory : Path</li> <li>□ Config Directory : Path</li> <li>□ Data Directory : Path</li> <li>□ Config/Unit Directory : Path</li> <li>□ Application Version Number : String</li> <li>□ Application Version History : String</li> <li>□ Framework Version Number : String</li> <li>□ RT-App Version Number : String</li> <li>□ FPGA Version Number : String</li> <li>□ Registry Contents : String</li> <li>□ global shutdown event : UserEvent</li> </ul>
<ul style="list-style-type: none"> <li>● <a href="#">hse-application_ApplicationInit()</a></li> <li>● <a href="#">hse-application_ApplicationShutdown()</a></li> <li>◆ <a href="#">hse-application_GetSingleton()</a></li> <li>◆ <a href="#">hse-application_SystemIdentifier()</a></li> <li>◆ <a href="#">hse-application_GetSystemConfigSession()</a></li> <li>◆ <a href="#">hse-application_DetermineFrameworkVersionNumber()</a></li> <li>◆ <a href="#">hse-application_DetermineProgramInfo()</a></li> <li>◆ <a href="#">hse-application_DetermineProgramPaths()</a></li> <li>◆ <a href="#">hse-application_DetermineProgramVersion()</a></li> <li>◆ <a href="#">hse-application_SystemConfiguration()</a></li> <li>◆ <a href="#">hse-application_SystemConfiguration_ReadFile()</a></li> <li>◆ <a href="#">hse-application_SystemConfiguration_ValidateFile()</a></li> <li>◆ <a href="#">hse-application_SystemConfiguration_ValidateUnit()</a></li> <li>◆ <a href="#">hse-application_ValidateConfigAndDataDirectories()</a></li> <li>◆ <a href="#">hse-application_VersionNumber--constant()</a></li> <li>● <a href="#">hse-application_DetermineAppBasePath()</a></li> <li>● <a href="#">hse-application_DetermineConfigAndDataDirectories()</a></li> <li>● <a href="#">hse-application_GetApplicationInfos()</a></li> <li>● <a href="#">hse-application_GetApplicationPaths()</a></li> <li>● <a href="#">hse-application_GetGlobalShutdownEvent()</a></li> <li>● <a href="#">hse-application_GetVersionInfos()</a></li> <li>● <a href="#">hse-application_SelectProjectFolder()</a></li> <li>● <a href="#">hse-application_SetApplicationUnitID()</a></li> <li>● <a href="#">hse-application_SetApplicationVersion()</a></li> <li>● <a href="#">hse-application_SetFpgaVersion()</a></li> <li>● <a href="#">hse-application_SetFrameworkVersion()</a></li> <li>● <a href="#">hse-application_SetRealtimeVersion()</a></li> </ul>


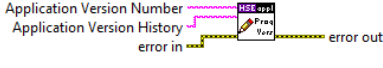

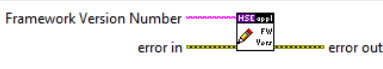
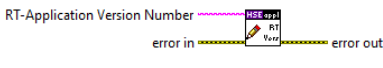
Table 26. Functions (non private scope only)



Name	Connector pane	Description	S.	R.	I.
hse-application_ApplicationInit		Initializes the HSE Application and its configuration variables with names, paths, version strings and other information.			



Name	Connector pane	Description	S.	R.	I.
hse-application_ApplicationShutdown		Stops and frees all hse resources.			
hse-application_GetSingleton	[hse-application.lvclass:hse-application</em>GetSingleton.vi]	Contains the DVR to the HSE ApplicationClass object.			
hse-application_SystemIdentifier	[hse-application.lvclass:hse-application</em>SystemIdentifier.vi]				
hse-application_GetSystemConfigSession	[hse-application.lvclass:hse-application</em>GetSystemConfigSession.vi]	Tries 10 times to create a System Configuration session reference			
hse-application_DetermineFrameworkVersionNumber		Sets the version of the framework used for the application.			
hse-application_DetermineProgramInfo					
hse-application_DetermineProgramPaths		Determines the Application Base, Configuration and Data paths.			
hse-application_DetermineProgramVersion					
hse-application_SystemConfiguration		Reads global (system-wide) configuration parameters from the config.ini file or creates it if it couldn't be found.			
hse-application_SystemConfiguration_ReadFile		Reads configuration parameters from the <b>Config File</b>.			
hse-application_SystemConfiguration_ValidateFile		Check if <b>Config File</b> exists. If it can't be read, try and copy config.ini.default over to config. ini and show a message. If that also doesn't work, throw an error and show a message.			
hse-application_SystemConfiguration_ValidateUnit		Check if <b>Unit Directory</b> exists.			

Name	Connector pane	Description	S.	R.	I.
hse-application_ValidateConfigAndDataDirectories		No description found (add content in vi description)			
hse-application_VersionNumber—constant		No description found (add content in vi description)			
hse-application_DetermineAppBasePath		Determines the "Root" path of the application: - When running from the development environment, this is identical to the application directory. - When running from the run-time environment, this includes the name of the .exe			
hse-application_DetermineConfigAndDataDirectories		Determines the paths of the _Config and _Data directories: - either by reading from the [HSE] section of <%APPNAME%>.ini in the application directory - or by defining them to live parallel to the application directory (this is HSE default)			
hse-application_GetApplicationInfos		Returns information on the application itself for display, logging, ...			
hse-application_GetApplicationPaths		Returns the various paths of the hse-lib based application's folder structure: - Application Directory (the folder on disk the startup.vi or the .exe is stored in) - Config Directory (the folder containing all the configuration files) - Data Directory (the folder designed to hold data generated by the application) - Config/Unit Directory (the folder holding the configuration for this unit - see config.ini file) - Tmp Directory (the system-specific temporary location)  The <b>Application Base Path</b> points to the root of the call chain. In the development environment, this path is identical to the Application Directory. In a built .exe, this path points to the .exe itself.			
hse-application_GetGlobalShutdownEvent		Returns information on the application itself for display, logging, ...			
hse-application_GetVersionInfos		Returns the various stored version numbers: Application Version: This project (the built application) Framework Version: The HSE UI-Framework (Windows Application Template) HSE-LIB Version: The hse-libraries			
hse-application_SelectProjectFolder		Opens a file dialog to select the folder in which the project file and the startup.vi are located.			



Name	Connector pane	Description	S.	R.	I.
hse-application_SetApplicationUnitID		Manually set the application "Unit ID".			
hse-application_SetApplicationVersion		Stores the version number of the application for later usage (display, logging, ...).			
hse-application_SetFpgaVersion		Stores the version number of the FPGA bitfile (if any) for later usage (display, logging, ...).			
hse-application_SetFrameworkVersion		Stores the version number of the framework for later usage (display, logging, ...).			
hse-application_SetRealtimeVersion		Stores the version number of the connected Real-Time application (if any).			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

## C.3. HSE-CONFIG-INI.LVCLASS

**Responsibility:** No description found (add content in lvclass description)

**Version:** 1.0.0.1

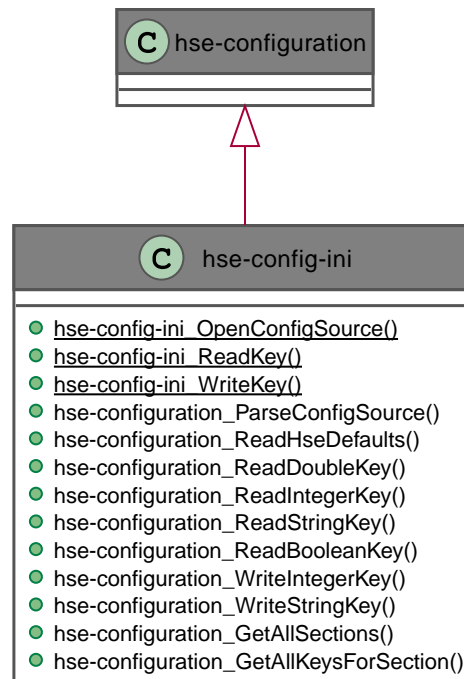





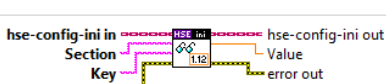



Table 27. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
hse-config-ini_OpenConfigSource		Finds the path to the <b>Name</b> .ini file inside the config/unit directory			
hse-config-ini_ReadKey		No description found (add content in vi description)			
hse-config-ini_WriteKey		No description found (add content in vi description)			
hse-configuration_ParseConfigSource		Reads the contents of the configuration file and keeps them in memory			
hse-configuration_ReadHseDefaultts		Reads HSE specific configuration values: [globals].descriptor (used as a configurable label for DQMH modules)			
hse-configuration_ReadDoubleKey		Reads the numeric configuration value (I32) identified by <b>section</b> and <b>key</b> from the configuration object			
hse-configuration_ReadIntegerKey		Reads the numeric configuration value (I32) identified by <b>section</b> and <b>key</b> from the configuration object			

Name	Connector pane	Description	S.	R.	I.
hse-configuration_ReadStringKey		Reads the string configuration value identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			
hse-configuration_ReadBooleanKey		Reads the numeric configuration value (I32) identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			
hse-configuration_WriteIntegerKey		Writes the string configuration <b>&lt;b&gt;value&lt;/b&gt;</b> identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> to the configuration object and the config source			
hse-configuration_WriteStringKey		Writes the string configuration <b>&lt;b&gt;value&lt;/b&gt;</b> identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> to the configuration object and the config source			
hse-configuration_GetAllSections		Reads the numeric configuration value (DOUBLE) identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			
hse-configuration_GetAllKeysForSection		Reads the numeric configuration value (DOUBLE) identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined



















## C.4. HSE-CONFIGURATION.LVCLASS

**Responsibility:** No description found (add content in lvclass description)

**Version:** 1.0.0.1

hse-configuration
Data Directory : Variant
<ul style="list-style-type: none"> <li> <a href="#">hse-configuration_ReadDataDirectory()</a></li> <li> <a href="#">hse-configuration_WriteDataDirectory()</a></li> <li> <a href="#">hse-configuration_ParseConfigSource()</a></li> <li> <a href="#">hse-configuration_ReadHseDefaults()</a></li> <li> <a href="#">hse-configuration_ReadDoubleKey()</a></li> <li> <a href="#">hse-configuration_ReadIntegerKey()</a></li> <li> <a href="#">hse-configuration_ReadStringKey()</a></li> <li> <a href="#">hse-configuration_ReadBooleanKey()</a></li> <li> <a href="#">hse-configuration_WriteIntegerKey()</a></li> <li> <a href="#">hse-configuration_WriteStringKey()</a></li> <li> <a href="#">hse-configuration_GetAllSections()</a></li> <li> <a href="#">hse-configuration_GetAllKeysForSection()</a></li> </ul>

Table 28. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
hse-configuration_ReadDataDirectory		No description found (add content in vi description)			
hse-configuration_WriteDataDirectory		No description found (add content in vi description)			
hse-configuration_ParseConfigSource		Parses the configuration source and stores the contents in memory for future use.			
hse-configuration_ReadHseDefaults		Reads HSE specific configuration values:  [globals].descriptor (used as a configurable label for DQMH modules)			
hse-configuration_ReadDoubleKey		Reads the numeric configuration value (DOUBLE) identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			
hse-configuration_ReadIntegerKey		Reads the numeric configuration value (I32) identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			
hse-configuration_ReadStringKey		Reads the string configuration value identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			
hse-configuration_ReadBooleanKey		Reads the numeric configuration value (DOUBLE) identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			
hse-configuration_WriteIntegerKey		Writes the string configuration <b>&lt;b&gt;value&lt;/b&gt;</b> identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> to the configuration object and the config source			
hse-configuration_WriteStringKey		Writes the string configuration <b>&lt;b&gt;value&lt;/b&gt;</b> identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> to the configuration object and the config source			
hse-configuration_GetAllSections		Reads the numeric configuration value (DOUBLE) identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			
hse-configuration_GetAllKeysForSection		Reads the numeric configuration value (DOUBLE) identified by <b>&lt;b&gt;section&lt;/b&gt;</b> and <b>&lt;b&gt;key&lt;/b&gt;</b> from the configuration object			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

## C.5. CONFIG-BASE.LVCLASS

**Responsibility:** Base class for the hse-configuration.

**Version:** 1.0.0.0

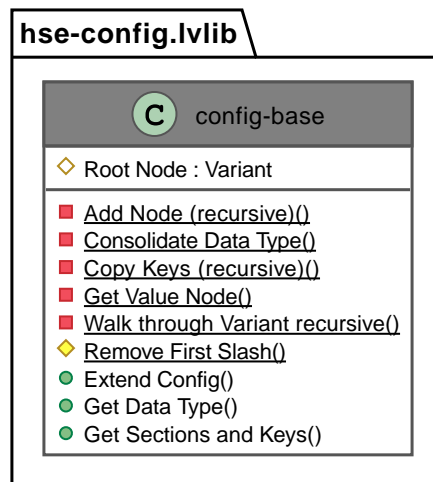










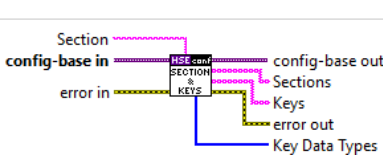



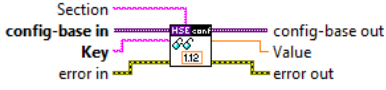





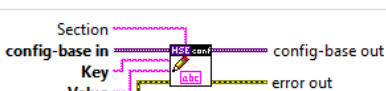


Table 29. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Read Root Node		No description found (add content in vi description)			
Write Root Node		No description found (add content in vi description)			
Remove First Slash		The "String to Array" can't handle a separation character (slash) as first element. This function removes a leading slash ("/") in "String In".			
Extend Config		Adds or replaces own config keys and sections with the content from "Additional Config".			
Get Data Type		Returns the data type of a key.			
Get Sections and Keys		Returns all sub-sections, keys and the data types of the keys in a section.			
Read Boolean		Returns a boolean config key.			

Name	Connector pane	Description	S.	R.	I.
Read Cluster		Returns a cluster of config values (can be nested) of the same type as "Type in". Use the "Variant to Data" function to convert the Variant back to the cluster type.			
Read Float		Returns a float (double) config key.			
Read Integer		Returns a integer (I64) config key.			
Read String		Returns a string config key.			
Write Boolean		Set a boolean config key.			
Write Cluster		Set a cluster of config keys, can be nested. The cluster labels correspond to sections in the config-oject.			
Write Float		Set a float config key.			
Write Integer		Set a integer config key.			
Write String		Set a string config key.			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

## C.6. CONFIG-INI.LVCLASS

**Responsibility:** Read and write INI-configuration files.

**Version:** 1.0.0.1

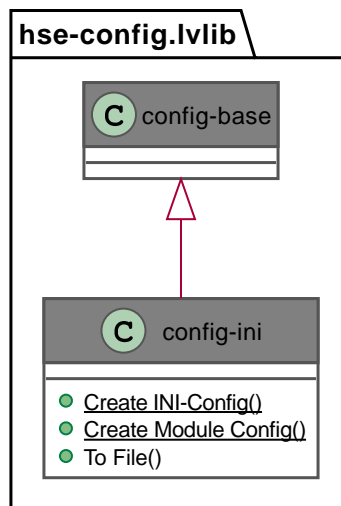


Table 30. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Create INI-Config		Creates a new "config-ini" object based on the INI-file given.			
Create Module Config		Loads the INI-file of an (HSE) DQMH module.			
To File		Writes the config-ini object to an INI-file.			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

## C.7. GENNET PROTOCOL.LVCLASS

**Responsibility:** No description found (add content in lvclass description)

**Version:** 1.0.0.1

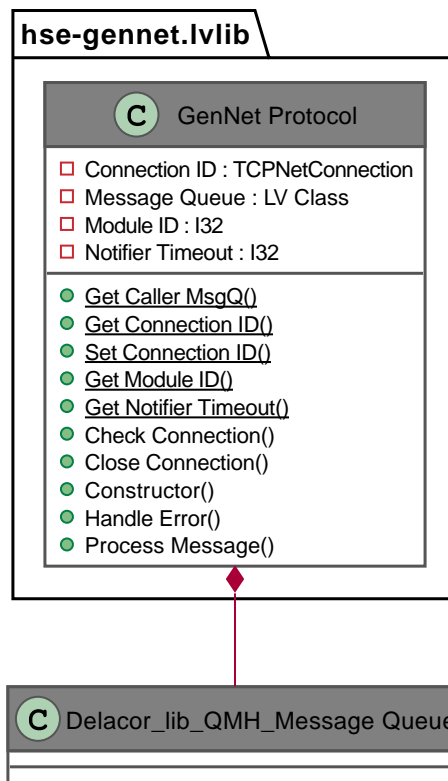






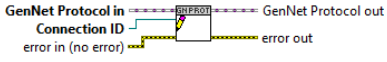





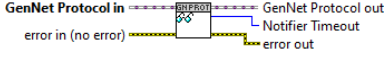


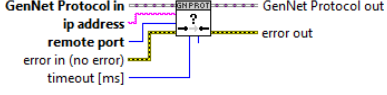



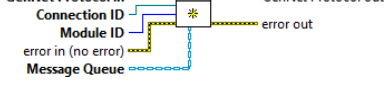



Table 31. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Get Caller MsgQ		No description found (add content in vi description)			
Get Connection ID		No description found (add content in vi description)			
Set Connection ID		No description found (add content in vi description)			
Get Module ID		No description found (add content in vi description)			
Get Notifier Timeout		No description found (add content in vi description)			
Check Connection		No description found (add content in vi description)			
Close Connection		No description found (add content in vi description)			
Constructor		No description found (add content in vi description)			



Name	Connector pane	Description	S.	R.	I.
Handle Error		No description found (add content in vi description)			
Process Message		No description found (add content in vi description)			
Read Message		No description found (add content in vi description)			
Write Message		No description found (add content in vi description)			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

## C.8. GENNET VARIANT PROTOCOL.LVCLASS

**Responsibility:** No description found (add content in lvclass description)

**Version:** 1.0.0.2

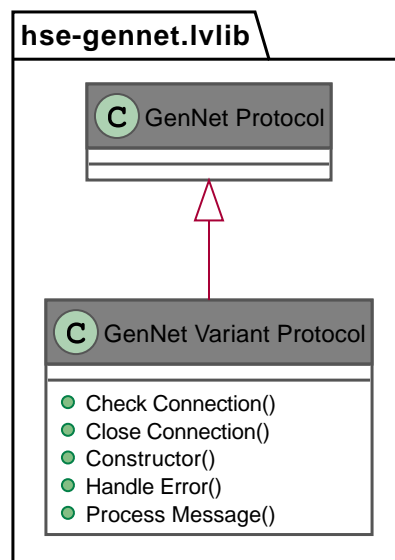
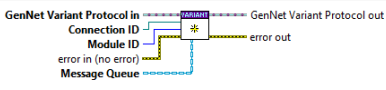

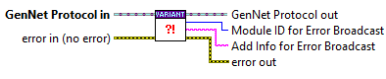










Table 32. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Check Connection		No description found (add content in vi description)			
Close Connection		No description found (add content in vi description)			

Name	Connector pane	Description	S.	R.	I.
Constructor		No description found (add content in vi description)			
Handle Error		No description found (add content in vi description)			
Process Message		No description found (add content in vi description)			
Read Message		No description found (add content in vi description)			
Write Message		No description found (add content in vi description)			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

## C.9. DQMH-GENNET MESSAGE QUEUE.LVCLASS

**Responsibility:** The DQMH-GenNet Message Queue class adds properties for network connection configuration and methods for forwarding messages to another module to the DQMH message queue.

**Version:** 1.0.0.2

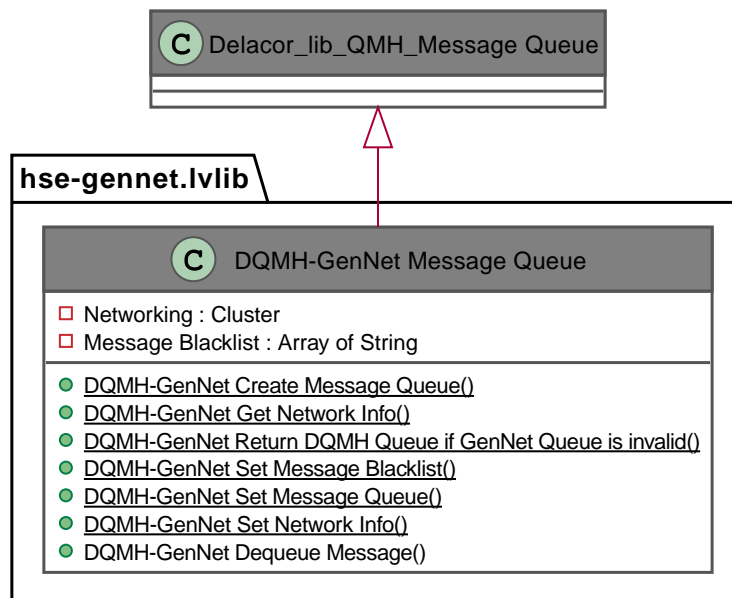



Table 33. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
DQMH-GenNet Create Message Queue		This is the modified "Create Message Queue" VI for DQMH Generic Networking			

Name	Connector pane	Description	S.	R.	I.
DQMH-GenNet Dequeue Message		This VI pulls messages off the DQMH Generic Networking Message Queue.			
DQMH-GenNet Get Network Info		Gets the network information from the Message Queue			
DQMH-GenNet Return DQMH Queue if GenNet Queue is invalid		No description found (add content in vi description)			
DQMH-GenNet Set Message Blacklist		sets the message message blacklist to the GenNet Message Queue. In default, Add is set to true and the current Blacklist will be extended. If it is set to false, the current Blacklist will be replaced.			
DQMH-GenNet Set Message Queue		Gets the message queue from the original DQMH object in <b>Message Queue in</b> and writes it to the <b>DQMH-GenNet Message Queue</b>			
DQMH-GenNet Set Network Info		Sets or clears the network info in the Message Queue private data			

Scope: → Protected | → Community

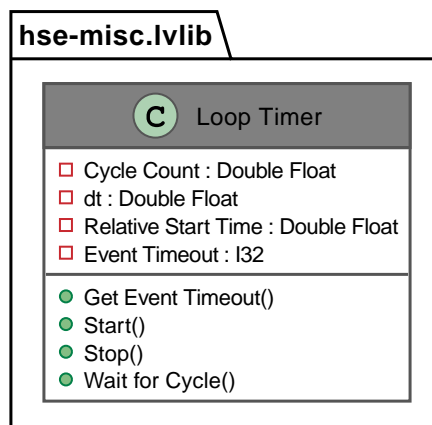
Reentrancy: → Preallocated reentrancy | → Shared reentrancy




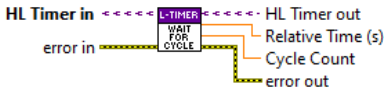
Inlining: → Inlined

## C.10. LOOP TIMER.LVCLASS

**Responsibility:** No description found (add content in lvclass description)

**Version:** 1.0.0.0



Name	Connector pane	Description	S.	R.	I.
Get Event Timeout		No description found (add content in vi description)			
Start		Start the timed loop by setting the event timeout to "0". The first iteration is executed immediately.			
Stop		Stop the timed loop by setting the event timeout to "-1".			
Wait for Cycle		Waits until the next time cycle is reached.			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

## C.11. NETSTREAM.LVCLASS

**Responsibility:** No description found (add content in lvclass description)

**Version:** 1.0.0.0

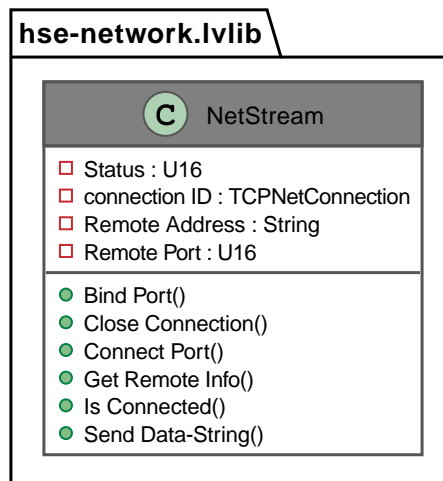
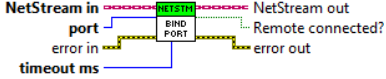
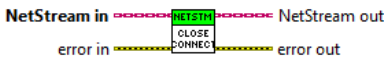
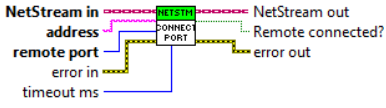


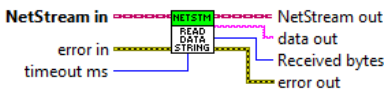
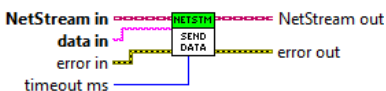



Table 35. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Bind Port		No description found (add content in vi description)			
Close Connection		No description found (add content in vi description)			

Name	Connector pane	Description	S.	R.	I.
Connect Port		No description found (add content in vi description)			
Get Remote Info		No description found (add content in vi description)			
Is Connected		No description found (add content in vi description)			
Read Data-String		No description found (add content in vi description)			
Send Data-String		No description found (add content in vi description)			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

# APPENDIX D: CUSTOM ERRORS

List of Custom Error VIs

## D.1. CUSTOM ERRORS



Custom errors are added via vi named `*--error.vi`.

Table 36. Custom errors

Name	Code	Description	Owned by
Module Running as Singleton	403680	The "%s" module is currently running as singleton, but the Start Module VI was called with 'Run as Singleton' specified as FALSE.	<a href="#">GenNet-Client.lvlib</a> <a href="#">GenNet-Server.lvlib</a>
Module Not Stopped	403682	%s Module did not finish clean up on exit.	<a href="#">GenNet-Client.lvlib</a> <a href="#">GenNet-Server.lvlib</a>
Module Not Synced	403683	%s Module was unable to synchronize events.	<a href="#">GenNet-Client.lvlib</a> <a href="#">GenNet-Server.lvlib</a>
Module Not Running	403684	Not a single instance of "%s" Module running.	<a href="#">GenNet-Client.lvlib</a> <a href="#">GenNet-Server.lvlib</a>
Module Running as Cloneable	403685	The "%s" module is currently running as cloneable, but the Start Module VI was called with 'Run as Singleton' specified as TRUE.	<a href="#">GenNet-Client.lvlib</a> <a href="#">GenNet-Server.lvlib</a>
DQMH Request Reply Timed Out	403686	The '%s' request for the %s module timed out.	<a href="#">[hse-dqmh.lvlib]</a>
Request Timed Out	403686	The reply for the request "%s" of the "%s" Module timed out.	<a href="#">GenNet-Client.lvlib</a>
Request and Wait for Reply Timeout	403686	%s	<a href="#">GenNet-Client.lvlib</a> <a href="#">GenNet-Server.lvlib</a>
Master Reference Not Closed	403687	The "%s" module cannot be run as singleton because the Master Reference is still open from a prior run as cloneable. If you plan on running this module as both singleton and cloneable, consider changing your Main VI to wire a value of TRUE to the 'Close Master Reference' input of Init Module.vi.	<a href="#">GenNet-Client.lvlib</a> <a href="#">GenNet-Server.lvlib</a>

# GLOSSARY

The rat-documentr tool facilitates the following LabVIEW-related tools and libraries:

- Antidoc by Wovalab
- AsciiDoc Toolkit by Wovalab
- Graph Builder by C. Gambini
- Classy by T. Boyé
- DQMH® by Delacor

Furthermore, it relies on the following tools and libraries:

- Ruby
- AsciiDoctor
- Java
- GraphViz