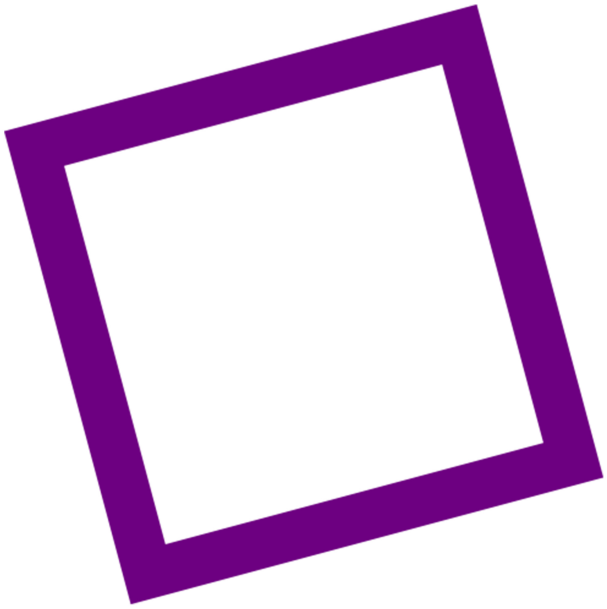


HAMPEL SOFTWARE ENGINEERING

TEMPLATE

HAMPEL SOFTWARE ENGINEERING

Version 2.6.2 (2024-07-04)

TABLE OF CONTENTS

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.

CHAPTER 1. PROJECT DESCRIPTION

This application template showcases our UI framework for applications with graphical user interfaces. We use this template as a container which loads the project-specific DQMH modules dynamically from a configuration file.

1.1. UI FRAMEWORK

The UI framework helps us with:

- reusing UI management code
- project-specific UI layouts
- displaying a fancy splash screen
- populating the Runtime Menu dynamically
- populating a navigation module dynamically
- generating an event log for debugging

…and much more!

The UI framework is built on top of the HSE Libraries and consists of a collection of DQMH modules and a few helper VIs.

1.1.1. FRAMEWORK MODULES

These DQMH modules are designed to be reused, hence they are generic and not part of the project-specific code of an application:

- Event Manager
- UI Manager
- Navigation

1.1.2. FRAMEWORK VIS

In order to dynamically load DQMH modules and to achieve some of the UI framework functionality, the following VIs are part of the framework, too:

STARTUP VI

The /startup.vi is used to run the application. It…

- shows a splash screen
- reads the main configuration (containing the list of modules to load)
- loads the UI Manager and the Event Manager modules
- loads a list of project modules (no static linkage)
- calls the “configure” requests of all the modules
- displays the front panel of the UI Manager module

PROJECT VIS

These are project-related or project-specific VIs that are supplied by the UI Framework but can or have to be modified for each project.

- /Project/Project.lvlib: Contains the project-specific VIs
- /Project/PROJECT_InitLogging.vi: Starts the hse-logger
- /Project/PROJECT_Name–constant.vi: Name of the project
- /Project/PROJECT_RunTimeMenu.rtm: Run-Time Menu for the application
- /Project/PROJECT_SplashScreen.vi: Splash Screen
- /Project/PROJECT_StartupSteps.ctl: List of steps for the startup.vi to execute
- /Project/PROJECT_UserCredentials.vi: List of users for the built-in login feature

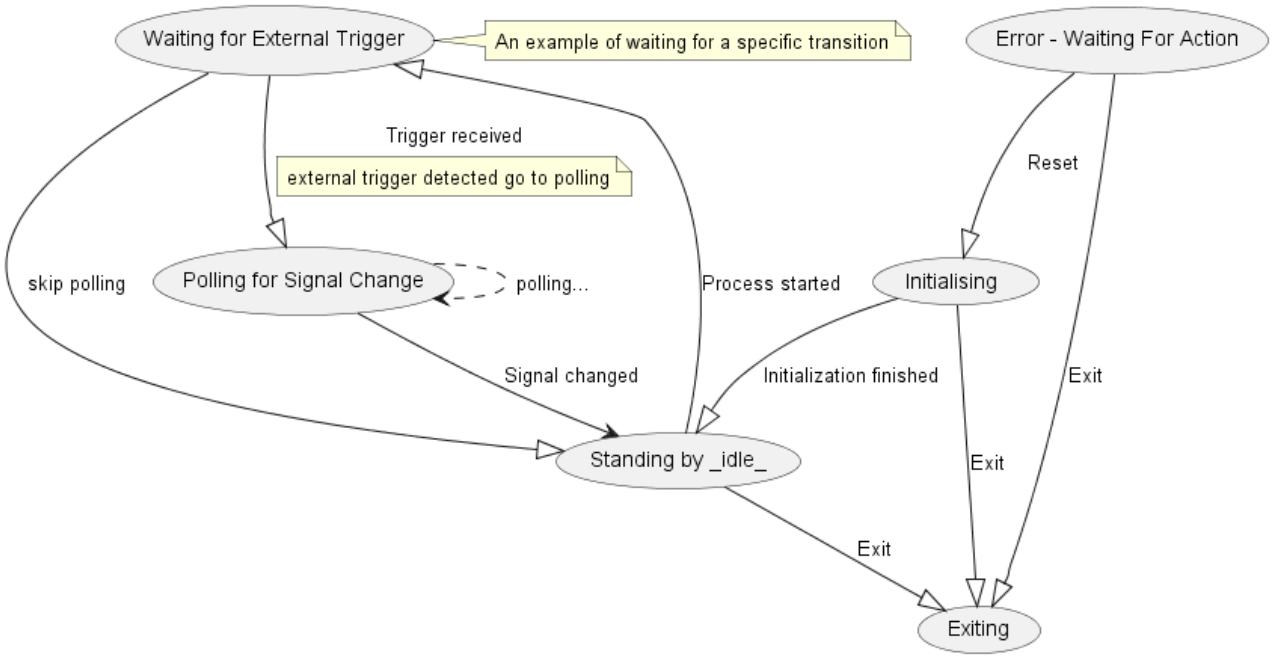
1.2. PROJECT-SPECIFIC DQMH MODULES

In order for DQMH modules to be compatible with our application template, these modules need to implement our HSE DQMH flavour.

CHAPTER 2. STATE MACHINES

2.1. STATEMACHINE

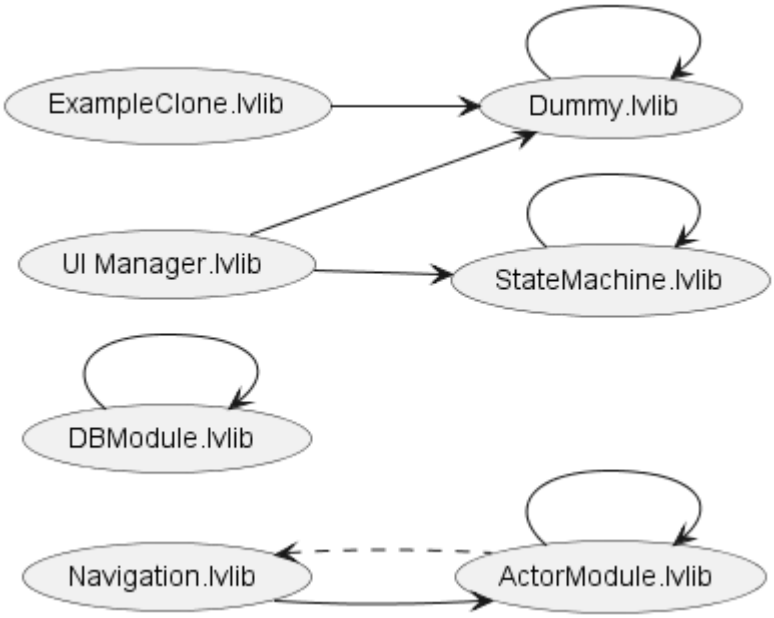
2.1.1. MAIN.VI



CHAPTER 3. CALLING DEPENDENCY DIAGRAMS

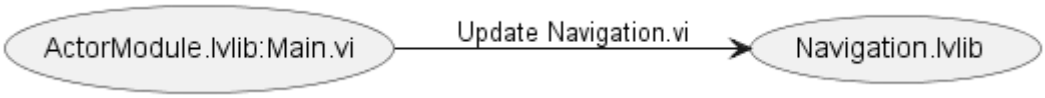
3.1. OVERVIEW

3.1.1. PROJECT

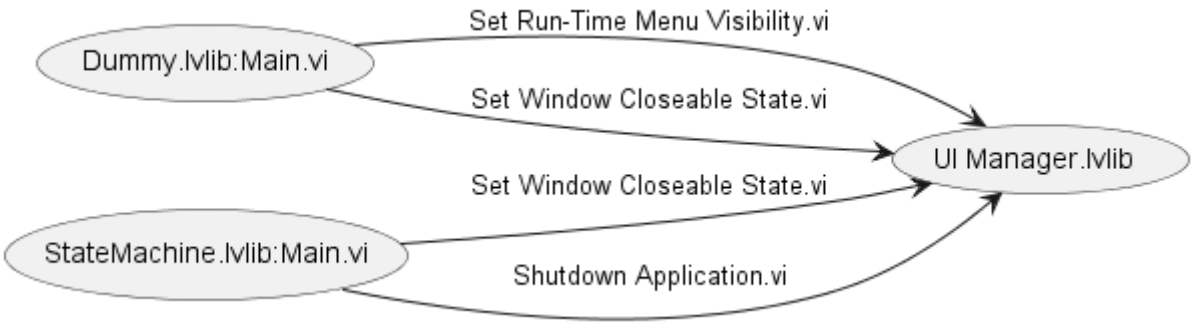


3.2. CALLERS

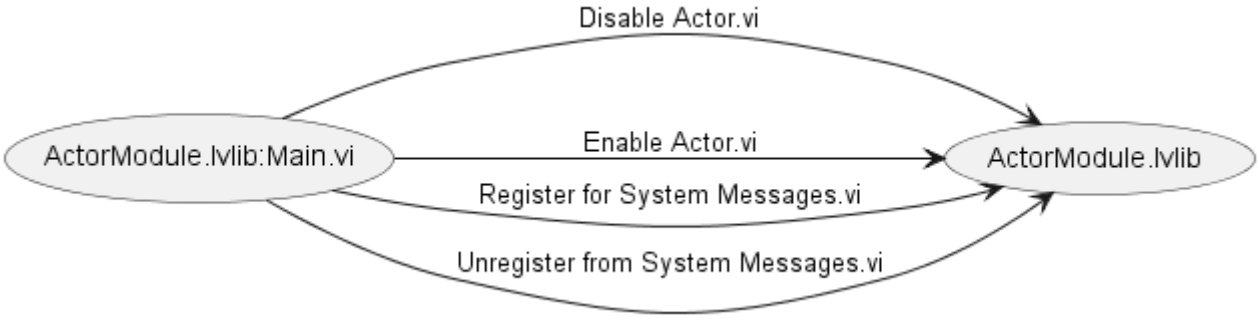
3.2.1. NAVIGATION.LVLIB



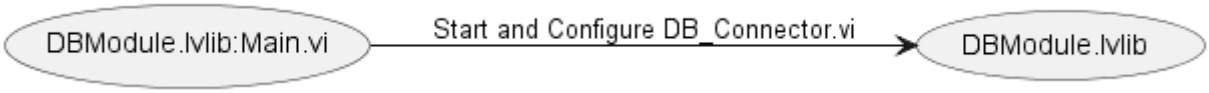
3.2.2. UI MANAGER.LVLIB



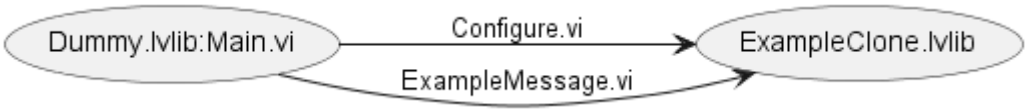
3.2.3. ACTORMODULE.LVLIB



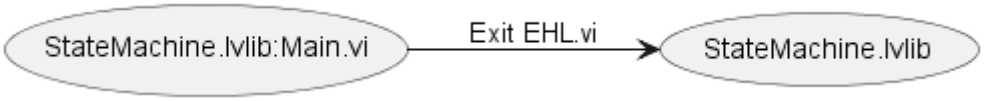
3.2.4. DBMODULE.LVLIB



3.2.5. EXAMPLECLONE.LVLIB

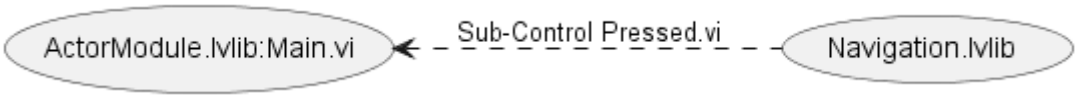


3.2.6. STATEMACHINE.LVLIB



3.3. LISTENERS

3.3.1. NAVIGATION.LVLIB



APPENDIX A: DQMH

DQMH modules documentation

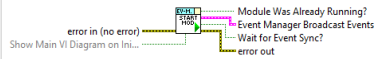
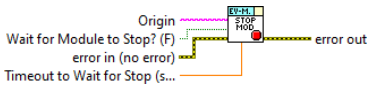
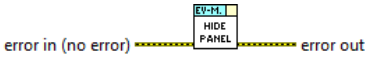
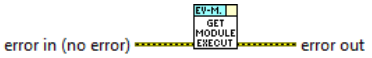
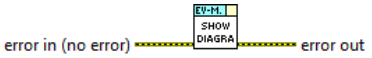
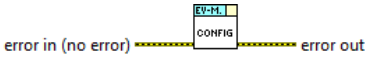
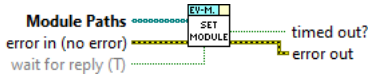
A.1. EVENT MANAGER.LVLIB

Type: Singleton

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			Send the Stop request to the Module's Main.vi. If Wait for Module to Stop? is TRUE, this VI will wait until the module main VI stops, and will timeout at the Timeout to Wait for Stop value. This value defaults to "-1", which means the VI will not timeout, and will always wait until the module main VI stops before completing execution. Note: The Timeout to Wait for Stop value is ignored if 'Wait for Module to Stop?' is set to FALSE.			
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.			
Get Module Execution Status			Fire the Get Module Execution Status request.			
Show Diagram			This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			
Configure			Triggers the auto-configuration of the module.			
Prepare			Prepares the front panel for display			
Set Modules			Tells the Event Manager module which modules are loaded so Event Manager can register for their broadcasts.			

Name	Type	Connector pane	Description	S.	R.	I.
Request UI Display		Scenario error in (no error) wait for reply (T) Accept? error out	Requests the module to display its UI as specified in Scenario: "managed" => in the UI Manager's subpanel "stand-alone" => as a separate window			
Module Did Init		Origin Initialized? error in (no error) error out	No description found (add content in vi description)			
Status Updated		Status error in (no error) error out	No description found (add content in vi description)			
Error Reported		Error Additional Information error in (no error) error out	Note: This VI was modified by the Validate DQMH Module tool to parse additional information tags out of the incoming error source string.			
Module Did Stop		Origin error in (no error) error out	No description found (add content in vi description)			
Update Module Execution Status		Running? error in (no error) error out	No description found (add content in vi description)			
System Message		Sys. Msg. Source Identifier Payload error in (no error) error out	Sends a HSE-generic broadcast message, consisting of an Identifier, a variant Payload and Source information.			
Register for module events		Status Updates Errors error in (no error) System Messages error out	Register for the given module events			

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
Configure	Test Event Manager API.vi

Request Name	Callers
Get Module Execution Status	Event Manager.lvlib:Obtain Broadcast Events for Registration.vi Event Manager.lvlib:Start Module.vi
Hide Panel	Test Event Manager API.vi
Prepare	Test Event Manager API.vi
Register for module events	Event Manager.lvlib:Register Modules in Event Manager—helper.vi
Request UI Display	Test Event Manager API.vi
Set Modules	Test Event Manager API.vi
Show Diagram	Test Event Manager API.vi
Show Panel	Test Event Manager API.vi

Table 3. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test Event Manager API.vi
Module Did Init	Test Event Manager API.vi
Module Did Stop	Test Event Manager API.vi
Status Updated	Test Event Manager API.vi
System Message	Test Event Manager API.vi
Update Module Execution Status	Test Event Manager API.vi

Table 4. Used requests

Module	Requests
Event Manager.lvlib	Register for module events.vi Stop Module.vi

Table 5. Registered broadcast

Module	Broadcasts
——	——

A.1.3. MODULE START/STOP CALLS

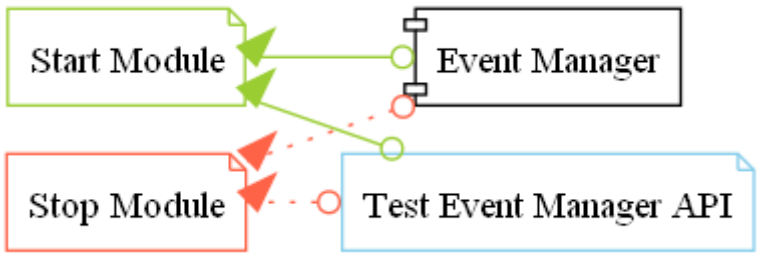


Table 6. Start and Stop module callers

Function	Callers
Start Module	Event Manager.lvlib:Load Module.vi Test Event Manager API.vi
Stop Module	Event Manager.lvlib:Handle Exit.vi Test Event Manager API.vi

A.1.4. MODULE CUSTOM ERRORS

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

Module Event Manager.lvlib use the following custom errors:

Table 7. Custom errors

Name	Code	Description
Module Not Running	403681	%s Module is not running.
Module Not Stopped	403682	The Stop Module VI for the %s module timed out while waiting for the module main VI to stop. The module main VI may still be running.
Module Not Synced	403683	%s Module was unable to synchronize events.
Request and Wait for Reply Timeout	403686	%s

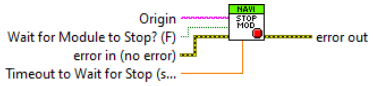
A.2. NAVIGATION.LVLIB

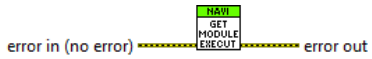
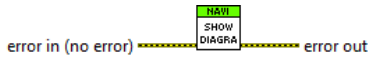
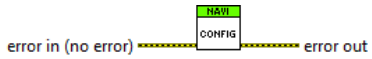
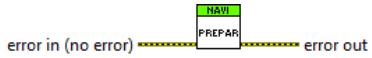
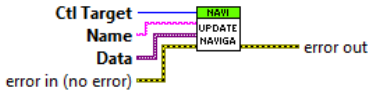
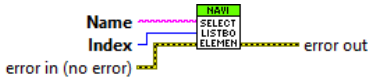
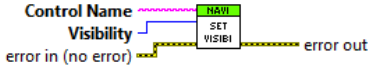
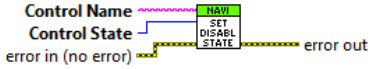
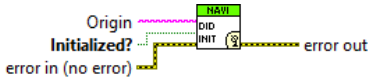
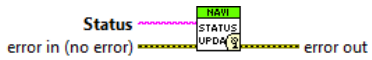
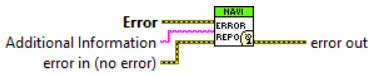
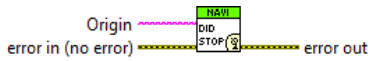
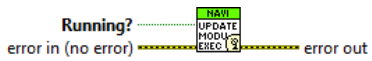
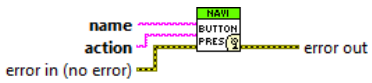
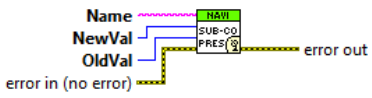
Type: Singleton

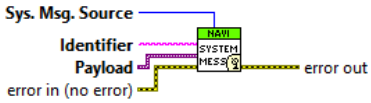
Responsibility: No description found (add content in DQMH module lvlib description)

A.2.1. EVENT LIST

Table 8. Events

Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			
Stop Module			Send the Stop request to the Module's Main.vi. If Wait for Module to Stop? is TRUE, this VI will wait until the module main VI stops, and will timeout at the Timeout to Wait for Stop value. This value defaults to "-1", which means the VI will not timeout, and will always wait until the module main VI stops before completing execution. Note: The Timeout to Wait for Stop value is ignored if 'Wait for Module to Stop?' is set to FALSE.			
Show Panel			Send the Show Panel request to the Module's Main.vi.			

Name	Type	Connector pane	Description	S.	R.	I.
Hide Panel			Send the Hide Panel request to the Module's Main.vi.			
Get Module Execution Status			Fire the Get Module Execution Status request.			
Show Diagram			This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			
Configure			Self-configuration (triggered automatically from main.vi)			
Prepare			Prepares the frontpanel for display.			
Update Navigation			Note: This VI was renamed by the DQMH Rename Event utility. Make sure the VI Description is updated to reflect the new event name, then delete this comment. Send information for updating the Sidebar to some state.			
Select Listbox Element			Shows a selection for the listbox element identified by name and index			
Set Visibility			Shows or hides a control			
Set Disabled State			Enables or disables a control identified by Control Name			
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			Note: This VI was modified by the Validate DQMH Module tool to parse additional information tags out of the incoming error source string.			
Module Did Stop			Send the Module Did Stop event to any VI registered to listen to this module's broadcast events.			
Update Module Execution Status			Broadcast event to specify whether or not the module is running.			
Button Pressed			Broadcasts the pressed button and optional data.			
Sub-Control Pressed			Broadcast the pressed sub-control and data related to the sub-control.			

Name	Type	Connector pane	Description	S.	R.	I.
System Message			Sends a HSE-generic broadcast message, consisting of an Identifier, a variant Payload and Source information.			

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

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

A.2.2. MODULE RELATIONSHIP

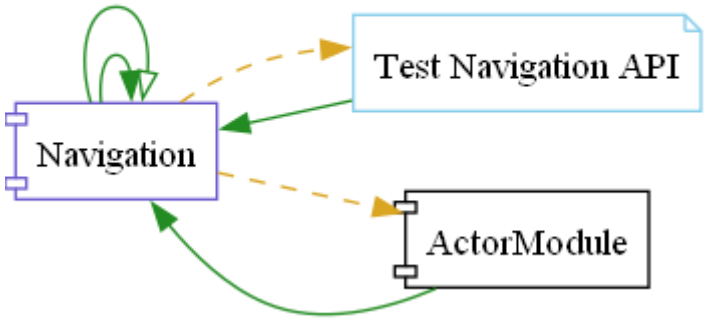


Table 9. Requests callers

Request Name	Callers
Configure	Test Navigation API.vi
Get Module Execution Status	Navigation.lvlib:Obtain Broadcast Events for Registration.vi Navigation.lvlib:Start Module.vi
Hide Panel	Test Navigation API.vi
Prepare	Test Navigation API.vi
Select Listbox Element	Test Navigation API.vi
Set Disabled State	Test Navigation API.vi
Set Visibility	Test Navigation API.vi
Show Diagram	Test Navigation API.vi
Show Panel	Test Navigation API.vi
Update Navigation	ActorModule.lvlib:Main.vi

Table 10. Broadcasts Listeners

Broadcast Name	Listeners
Button Pressed	Test Navigation API.vi
Error Reported	Test Navigation API.vi

Broadcast Name	Listeners
Module Did Init	Test Navigation API.vi
Module Did Stop	Test Navigation API.vi
Status Updated	Test Navigation API.vi
Sub-Control Pressed	Test Navigation API.vi ActorModule.lvlib:Main.vi
System Message	Test Navigation API.vi
Update Module Execution Status	Test Navigation API.vi

Table 11. Used requests

Module	Requests
Navigation.lvlib	Stop Module.vi

Table 12. Registered broadcast

Module	Broadcasts
—	—

A.2.3. MODULE START/STOP CALLS

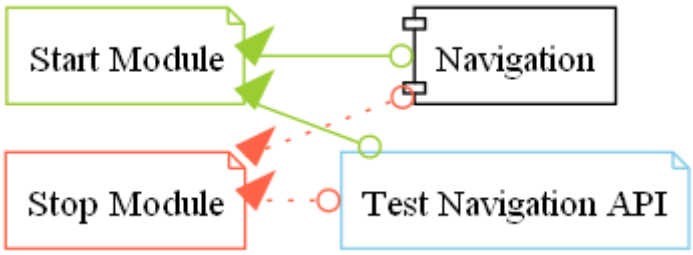


Table 13. Start and Stop module callers

Function	Callers
Start Module	Navigation.lvlib:Load Module.vi Test Navigation API.vi
Stop Module	Navigation.lvlib:Handle Exit.vi Test Navigation API.vi

A.2.4. MODULE CUSTOM ERRORS

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

Module Navigation.lvlib use the following custom errors:

Table 14. Custom errors

Name	Code	Description
Module Not Running	403681	%s Module is not running.
Module Not Stopped	403682	The Stop Module VI for the %s module timed out while waiting for the module main VI to stop. The module main VI may still be running.

Name	Code	Description
Module Not Synced	403683	%s Module was unable to synchronize events.
Request and Wait for Reply Timeout	403686	%s

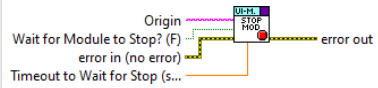
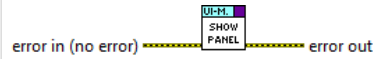
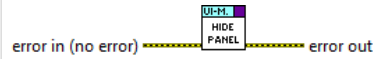
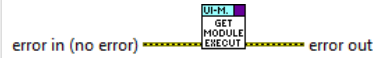
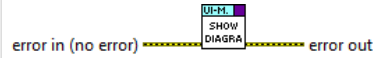
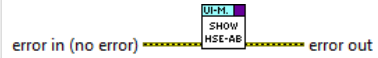
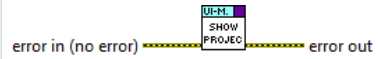
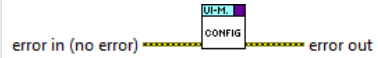
A.3. UI MANAGER.LVLIB

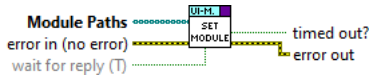
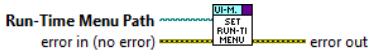
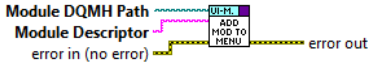
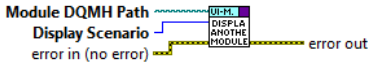
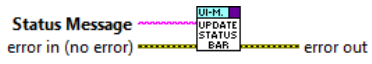
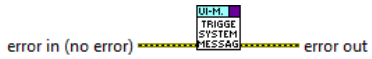
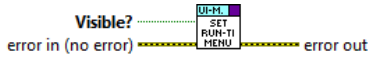
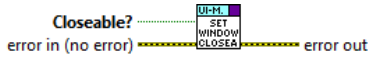
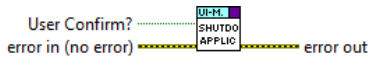
Type: Singleton

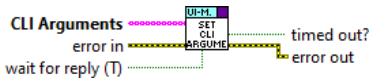
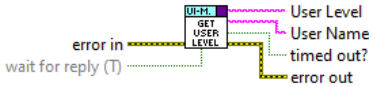
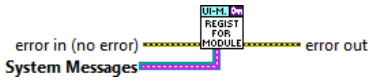
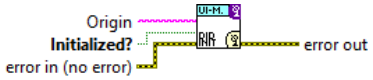
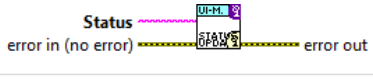
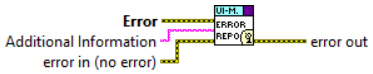
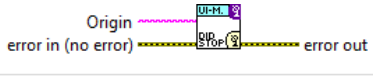
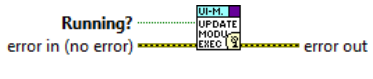
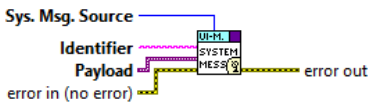
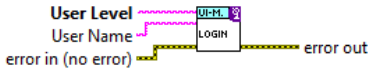
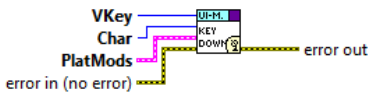
Responsibility: No description found (add content in DQMH module lvlib description)

A.3.1. EVENT LIST

Table 15. Events

Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			
Stop Module			Send the Stop request to the Module's Main.vi. If Wait for Module to Stop? is TRUE, this VI will wait until the module main VI stops, and will timeout at the Timeout to Wait for Stop value. This value defaults to "-1", which means the VI will not timeout, and will always wait until the module main VI stops before completing execution. Note: The Timeout to Wait for Stop value is ignored if 'Wait for Module to Stop?' is set to FALSE.			
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.			
Get Module Execution Status			Fire the Get Module Execution Status request.			
Show Diagram			This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			
Show HSE-ABOUT			Shows the About window of Hampel Software Engineering			
Show PROJECT-ABOUT			Shows the About window of this application			
Configure			Triggers the auto-configuration of the module.			

Name	Type	Connector pane	Description	S.	R.	I.
Prepare			Prepares the module for displaying its front panel			
Set Modules			Lets UI know which modules are loaded so it can register for broadcast events			
Set Run-Time Menu			Loads the Run-Time Menu set in Run-Time Menu Path			
Add Module to Run-Time Menu			Add module options (show in subpanel, open window, show BD) to the Run-Time Menu			
Remove Module from Run-Time Menu			Removes all run-time menu entries for the given module			
Display another Module UI			Note: This VI was renamed by the DQMH Rename Event utility. Make sure the VI Description is updated to reflect the new event name, then delete this comment. Note: This VI was renamed by the DQMH Rename Event utility. Make sure the VI Description is updated to reflect the new event name, then delete this comment. Requests another module to display its UI in the given Display Scenario: The "Stand-Alone" scenario asks the module to open its front panel as a new windows. The "Managed" scenario asks the module to broadcast a request for display which the UI Manager then processes, showing the module in its subpanel.			
Update Status Bar			Prints a message to the status bar			
Trigger System Message			Manually triggers a System Message broadcast event			
Set Run-Time Menu Visibility			Sets the Visibility of the Run-Time Menu. Setting Visible? to true shows the menu, while setting it to false hides it.			
Set Window Closeable State			Sets the closeable state of the window. Setting Closeable? to true enables the close button in the title bar, while setting it to false disables it.			
Shutdown Application			Tell the UI Manager to initiate the application shutdown sequence. Optionally show a confirmation dialog.			

Name	Type	Connector pane	Description	S.	R.	I.
Set CLI Arguments			Note: This VI was renamed by the DQMH Rename Event utility. Make sure the VI Description is updated to reflect the new event name, then delete this comment. requests the UI Manager to broadcast the arguments via System Message			
Get CLI Arguments			requests the UI Manager to provide the CLI Arguments			
External Login			User logged in from another module			
Get User Level			Returns the User credentials to the requester			
Register for Module Events			Registers for the default module events			
Module Did Init			No description found (add content in vi description)			
Status Updated			No description found (add content in vi description)			
Error Reported			Note: This VI was modified by the Validate DQMH Module tool to parse additional information tags out of the incoming error source string.			
Module Did Stop			No description found (add content in vi description)			
Update Module Execution Status			Note: This VI was modified by the Validate DQMH Module tool to have a broadcast event glyph overlay on its icon.			
System Message			Sends a HSE-generic broadcast message, consisting of an Identifier, a variant Payload and Source information. Note: This VI was modified by the Validate DQMH Module tool to have a broadcast event glyph overlay on its icon.			
Login			No description found (add content in vi description)			
Key down			Forwards certain key down events via broadcast to allow other modules to react to those			

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

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

A.3.2. MODULE RELATIONSHIP

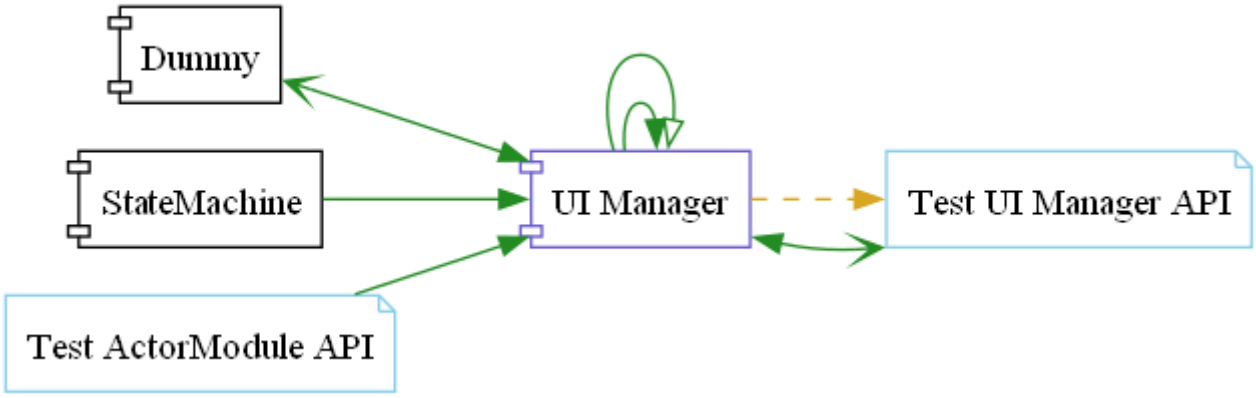


Table 16. Requests callers

Request Name	Callers
Add Module to Run-Time Menu	Test UI Manager API.vi
Configure	Test UI Manager API.vi
Display another Module UI	
External Login	Test UI Manager API.vi
Get CLI Arguments	Dummy.lvlib:Main.vi Test UI Manager API.vi
Get Module Execution Status	UI Manager.lvlib:Obtain Broadcast Events for Registration.vi UI Manager.lvlib:Start Module.vi
Get User Level	Test UI Manager API.vi
Hide Panel	Test UI Manager API.vi
Prepare	Test UI Manager API.vi
Register for Module Events	UI Manager.lvlib:Register Modules in UI Manager—helper.vi
Remove Module from Run-Time Menu	Test UI Manager API.vi
Set CLI Arguments	Test UI Manager API.vi
Set Modules	Test UI Manager API.vi
Set Run-Time Menu Visibility	Dummy.lvlib:Main.vi Test UI Manager API.vi
Set Run-Time Menu	Test UI Manager API.vi
Set Window Closeable State	Dummy.lvlib:Main.vi StateMachine.lvlib:Main.vi Test UI Manager API.vi
Show Diagram	Test UI Manager API.vi
Show HSE-ABOUT	Test UI Manager API.vi
Show PROJECT-ABOUT	Test UI Manager API.vi

Request Name	Callers
Show Panel	Test UI Manager API.vi
Shutdown Application	StateMachine.lvlib:Main.vi Test UI Manager API.vi
Trigger System Message	Test ActorModule API.vi Test UI Manager API.vi
Update Status Bar	

Table 17. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test UI Manager API.vi
Key down	
Login	Test UI Manager API.vi
Module Did Init	Test UI Manager API.vi
Module Did Stop	Test UI Manager API.vi
Status Updated	Test UI Manager API.vi
System Message	Test UI Manager API.vi
Update Module Execution Status	Test UI Manager API.vi

Table 18. Used requests

Module	Requests
UI Manager.lvlib	Register for Module Events.vi Stop Module.vi

Table 19. Registered broadcast

Module	Broadcasts
—	—

A.3.3. MODULE START/STOP CALLS

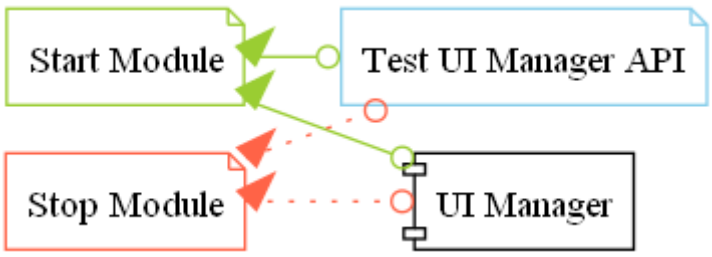


Table 20. Start and Stop module callers

Function	Callers
Start Module	Test UI Manager API.vi UI Manager.lvlib:Load Module.vi
Stop Module	Test UI Manager API.vi UI Manager.lvlib:Handle Exit.vi

A.3.4. MODULE CUSTOM ERRORS

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

Module UI Manager.lvlib use the following custom errors:

Table 21. Custom errors

Name	Code	Description
Module Not Running	403681	%s Module is not running.
Module Not Stopped	403682	The Stop Module VI for the %s module timed out while waiting for the module main VI to stop. The module main VI may still be running.
Module Not Synced	403683	%s Module was unable to synchronize events.
Request and Wait for Reply Timeout	403686	%s

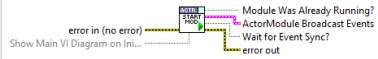
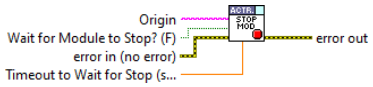
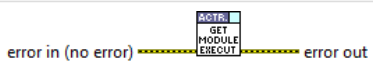
A.4. ACTORMODULE.LVLIB

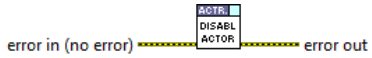
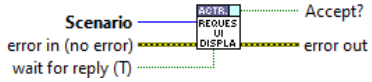
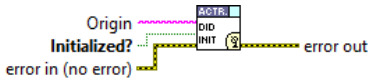
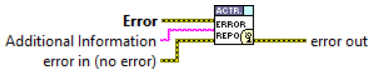
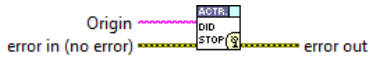
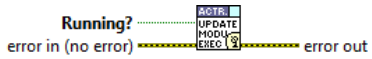
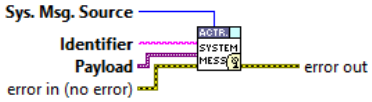
Type: Singleton

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

A.4.1. EVENT LIST

Table 22. Events

Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			
Stop Module			Send the Stop request to the Module's Main.vi. If Wait for Module to Stop? is TRUE, this VI will wait until the module main VI stops, and will timeout at the Timeout to Wait for Stop value. This value defaults to "-1", which means the VI will not timeout, and will always wait until the module main VI stops before completing execution. Note: The Timeout to Wait for Stop value is ignored if 'Wait for Module to Stop?' is set to FALSE.			
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.			
Get Module Execution Status			Fire the Get Module Execution Status request.			

Name	Type	Connector pane	Description	S.	R.	I.
Show Diagram			This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			
Prepare			Prepare (the UI of the) module for display			
Configure			Triggers the auto-configuration of the module			
Enable Actor			Activates the helper loop timeout structure			
Disable Actor			Stops the timeout polling of the helper loop			
Register for System Messages			Registers for other modules' System Message broadcast events			
Unregister from System Messages			Unregisters from other modules' System Message broadcast events			
Request UI Display			Requests the module to display its UI as specified in Scenario: "managed" => in the UI Manager's subpanel "stand-alone" => as a separate window			
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			Note: This VI was modified by the Validate DQMH Module tool to parse additional information tags out of the incoming error source string.			
Module Did Stop			Send the Module Did Stop event to any VI registered to listen to this module's broadcast events.			
Update Module Execution Status			Broadcast event to specify whether or not the module is running.			
System Message			Broadcasts a "System Message" consisting of an Identifier (string), a Payload (variant) and a Source (enum). Source values are: - "module": A broadcast from within a module itself - "application": A broadcast generated from outside a module - "network": A broadcast sent/received via network			

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

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

A.4.2. MODULE RELATIONSHIP

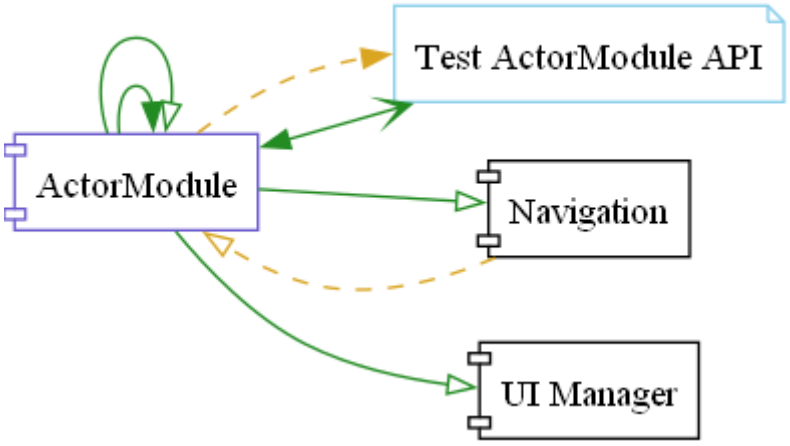


Table 23. Requests callers

Request Name	Callers
Configure	Test ActorModule API.vi
Disable Actor	ActorModule.lvlib:Main.vi Test ActorModule API.vi
Enable Actor	ActorModule.lvlib:Main.vi Test ActorModule API.vi
Get Module Execution Status	ActorModule.lvlib:Obtain Broadcast Events for Registration.vi ActorModule.lvlib:Start Module.vi
Hide Panel	Test ActorModule API.vi
Prepare	Test ActorModule API.vi
Register for System Messages	ActorModule.lvlib:Main.vi Test ActorModule API.vi
Request UI Display	Test ActorModule API.vi
Show Diagram	Test ActorModule API.vi
Show Panel	Test ActorModule API.vi
Unregister from System Messages	ActorModule.lvlib:Main.vi Test ActorModule API.vi

Table 24. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test ActorModule API.vi
Module Did Init	Test ActorModule API.vi

Broadcast Name	Listeners
Module Did Stop	Test ActorModule API.vi
Status Updated	Test ActorModule API.vi
System Message	Test ActorModule API.vi
Update Module Execution Status	Test ActorModule API.vi

Table 25. Used requests

Module	Requests
ActorModule.lvlib	Disable Actor.vi Enable Actor.vi Register for System Messages.vi Stop Module.vi Unregister from System Messages.vi
Navigation.lvlib	Get Module Execution Status.vi Update Navigation.vi
UI Manager.lvlib	Get Module Execution Status.vi

Table 26. Registered broadcast

Module	Broadcasts
Navigation.lvlib	Sub-Control Pressed.vi

A.4.3. MODULE START/STOP CALLS

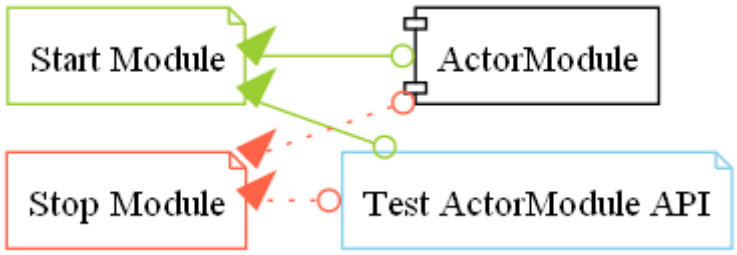


Table 27. Start and Stop module callers

Function	Callers
Start Module	ActorModule.lvlib:Load Module.vi Test ActorModule API.vi
Stop Module	ActorModule.lvlib:Handle Exit.vi Test ActorModule API.vi

A.4.4. MODULE CUSTOM ERRORS

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

Module ActorModule.lvlib use the following custom errors:

Table 28. Custom errors

Name	Code	Description
Module Not Running	403681	%s Module is not running.
Module Not Stopped	403682	The Stop Module VI for the %s module timed out while waiting for the module main VI to stop. The module main VI may still be running.
Module Not Synced	403683	%s Module was unable to synchronize events.
Request and Wait for Reply Timeout	403686	%s

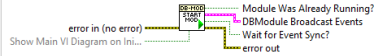
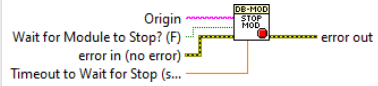
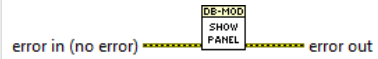
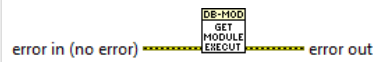
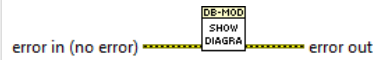
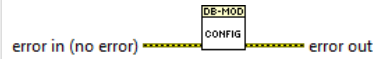
A.5. DBMODULE.LVLIB

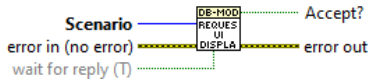
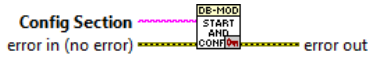
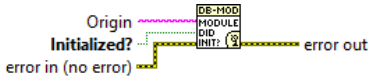
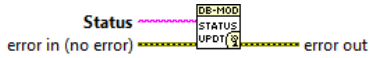
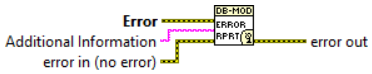
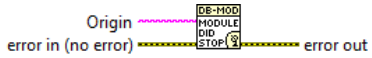
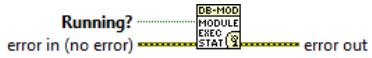
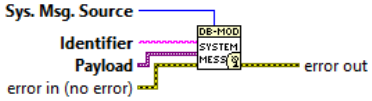
Type: Singleton

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

A.5.1. EVENT LIST

Table 29. Events

Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			
Stop Module			Send the Stop request to the Module's Main.vi. If Wait for Module to Stop? is TRUE, this VI will wait until the module main VI stops, and will timeout at the Timeout to Wait for Stop value. This value defaults to "-1", which means the VI will not timeout, and will always wait until the module main VI stops before completing execution. Note: The Timeout to Wait for Stop value is ignored if 'Wait for Module to Stop?' is set to FALSE.			
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.			
Get Module Execution Status			Fire the Get Module Execution Status request.			
Show Diagram			This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			
Configure			Triggers the auto-configuration of the module.			
Prepare			Prepare (the UI of the) module for display.			

Name	Type	Connector pane	Description	S.	R.	I.
Request UI Display			Requests the module to display its UI as specified in Scenario: "managed" => in the UI Manager's subpanel "stand-alone" => as a separate window			
Start and Configure DB_Connector			starts and configures the DB_Connector Module			
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			Note: This VI was modified by the Validate DQMH Module tool to parse additional information tags out of the incoming error source string.			
Module Did Stop			Send the Module Did Stop event to any VI registered to listen to this module's broadcast events.			
Update Module Execution Status			Broadcast event to specify whether or not the module is running.			
System Message			Broadcast a system generic message.			

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

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

A.5.2. MODULE RELATIONSHIP

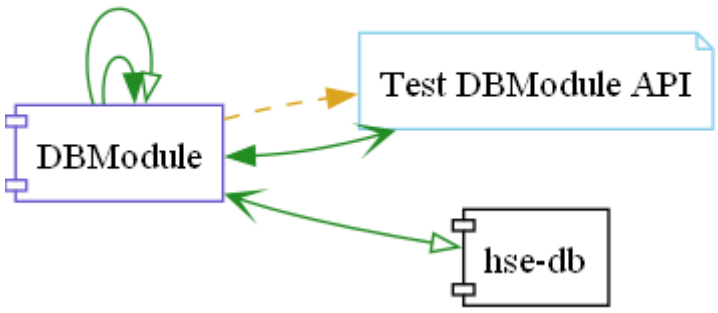


Table 30. Requests callers

Request Name	Callers
Configure	Test DBModule API.vi
Get Module Execution Status	DBModule.lvlib:Obtain Broadcast Events for Registration.vi DBModule.lvlib:Start Module.vi
Hide Panel	Test DBModule API.vi
Prepare	Test DBModule API.vi
Request UI Display	Test DBModule API.vi
Show Diagram	Test DBModule API.vi
Show Panel	Test DBModule API.vi
Start and Configure DB_Connector	DBModule.lvlib:Main.vi

Table 31. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test DBModule API.vi
Module Did Init	Test DBModule API.vi
Module Did Stop	Test DBModule API.vi
Status Updated	Test DBModule API.vi
System Message	Test DBModule API.vi
Update Module Execution Status	Test DBModule API.vi

Table 32. Used requests

Module	Requests
DBModule.lvlib	Start and Configure DB_Connector.vi Stop Module.vi
hse-db.lvlib	DB_CONNECTOR.lvlib:Configure.vi DB_CONNECTOR.lvlib:Get DB-Type.vi DB_CONNECTOR.lvlib:Query.vi (3) DB_CONNECTOR.lvlib:Stop Module.vi

Table 33. Registered broadcast

Module	Broadcasts
—	—

A.5.3. MODULE START/STOP CALLS

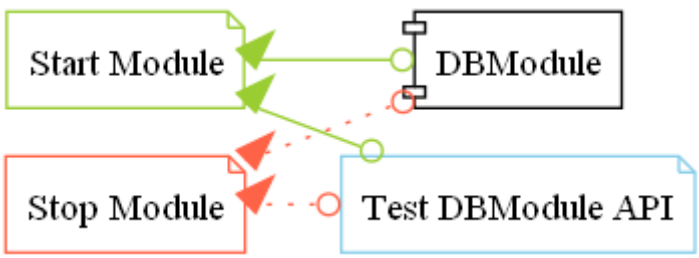


Table 34. Start and Stop module callers

Function	Callers
Start Module	DBModule.lvlib:Load Module.vi Test DBModule API.vi
Stop Module	DBModule.lvlib:Handle Exit.vi Test DBModule API.vi

A.5.4. MODULE CUSTOM ERRORS

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

Module DBModule.lvlib use the following custom errors:

Table 35. Custom errors

Name	Code	Description
Module Not Running	403681	%s Module is not running.
Module Not Stopped	403682	The Stop Module VI for the %s module timed out while waiting for the module main VI to stop. The module main VI may still be running.
Module Not Synced	403683	%s Module was unable to synchronize events.
Request and Wait for Reply Timeout	403686	%s

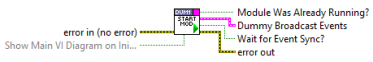
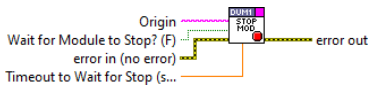
A.6. DUMMY.LVLIB

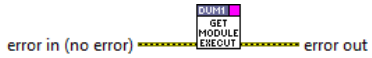
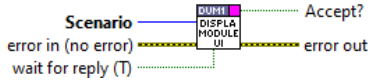
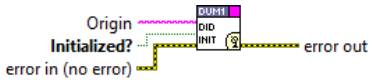
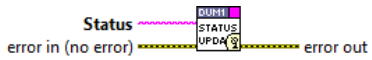
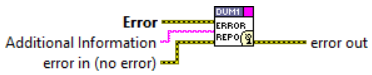
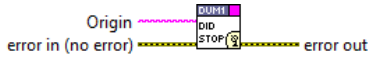
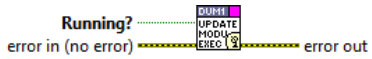
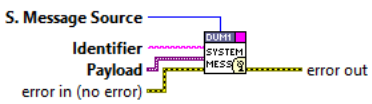
Type: Singleton

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

A.6.1. EVENT LIST

Table 36. Events

Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			
Stop Module			Send the Stop request to the Module's Main.vi. If Wait for Module to Stop? is TRUE, this VI will wait until the module main VI stops, and will timeout at the Timeout to Wait for Stop value. This value defaults to "-1", which means the VI will not timeout, and will always wait until the module main VI stops before completing execution. Note: The Timeout to Wait for Stop value is ignored if 'Wait for Module to Stop?' is set to FALSE.			

Name	Type	Connector pane	Description	S.	R.	I.
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.			
Get Module Execution Status			Fire the Get Module Execution Status request.			
Show Diagram			This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			
Configure			Self-configuration (triggered automatically from main.vi)			
Prepare			Prepare (the UI of the) module for display			
Register for UI Login			Registers for the UI module's "Login" broadcast event			
Request UI Display			Requests the module to display its UI as specified in Scenario: "managed" => in the UI Manager's subpanel "stand-alone" => as a separate window			
Module Did Init			No description found (add content in vi description)			
Status Updated			Note: This VI was modified by the Validate DQMH Module tool to have a broadcast event glyph overlay on its icon.			
Error Reported			Note: This VI was modified by the Validate DQMH Module tool to parse additional information tags out of the incoming error source string.			
Module Did Stop			No description found (add content in vi description)			
Update Module Execution Status			No description found (add content in vi description)			
System Message			Note: This VI was modified by the Validate DQMH Module tool to have a broadcast event glyph overlay on its icon.			

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

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

A.6.2. MODULE RELATIONSHIP

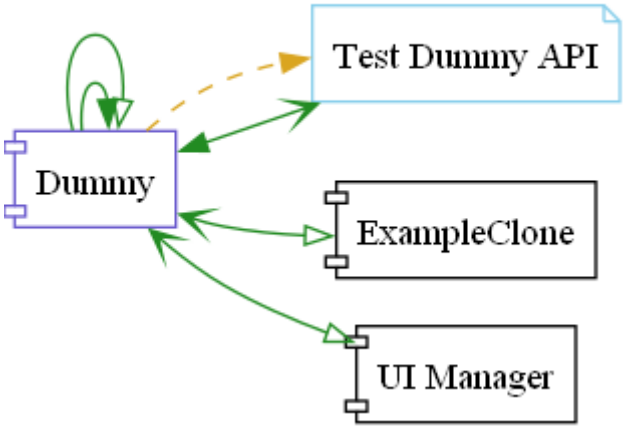


Table 37. Requests callers

Request Name	Callers
Configure	Test Dummy API.vi
Get Module Execution Status	Dummy.lvlib:Obtain Broadcast Events for Registration.vi Dummy.lvlib:Start Module.vi
Hide Panel	Test Dummy API.vi
Prepare	Test Dummy API.vi
Register for UI Login	
Request UI Display	Test Dummy API.vi
Show Diagram	Test Dummy API.vi
Show Panel	Test Dummy API.vi

Table 38. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test Dummy API.vi
Module Did Init	Test Dummy API.vi
Module Did Stop	Test Dummy API.vi
Status Updated	Test Dummy API.vi
System Message	Test Dummy API.vi
Update Module Execution Status	Test Dummy API.vi

Table 39. Used requests

Module	Requests
Dummy.lvlib	Stop Module.vi

Module	Requests
ExampleClone.lvlib	Configure.vi ExampleMessage.vi Request UI Display.vi Show Diagram.vi Stop Module.vi (2)
UI Manager.lvlib	Get CLI Arguments.vi Get Module Execution Status.vi Set Run-Time Menu Visibility.vi (2) Set Window Closeable State.vi (2)

Table 40. Registered broadcast

Module	Broadcasts
——	——

A.6.3. MODULE START/STOP CALLS

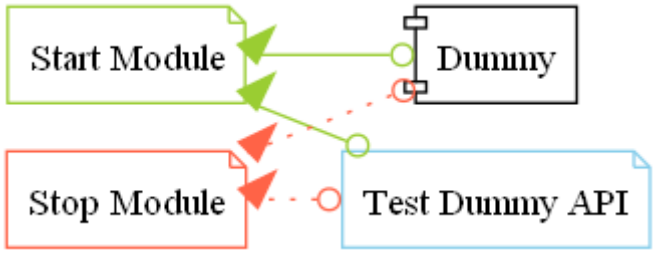


Table 41. Start and Stop module callers

Function	Callers
Start Module	Dummy.lvlib:Load Module.vi Test Dummy API.vi
Stop Module	Dummy.lvlib:Handle Exit.vi Test Dummy API.vi

A.6.4. MODULE CUSTOM ERRORS

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

Module Dummy.lvlib use the following custom errors:

Table 42. Custom errors

Name	Code	Description
Module Not Running	403681	%s Module is not running.
Module Not Stopped	403682	The Stop Module VI for the %s module timed out while waiting for the module main VI to stop. The module main VI may still be running.
Module Not Synced	403683	%s Module was unable to synchronize events.
Request and Wait for Reply Timeout	403686	%s

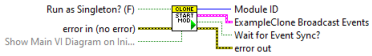
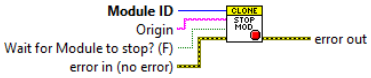
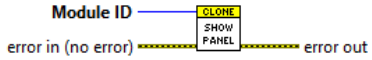
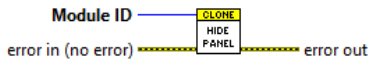
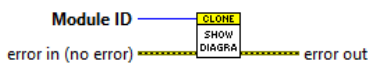
A.7. EXAMPLECLONE.LVLIB

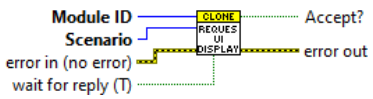
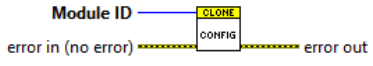
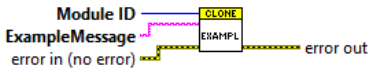
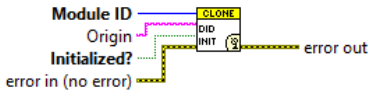
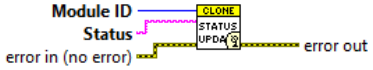
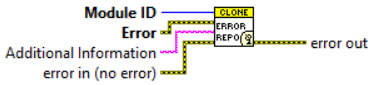
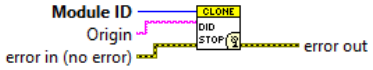
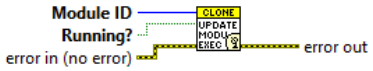
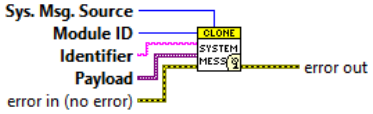
Type: Cloneable

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

A.7.1. EVENT LIST

Table 43. Events

Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			
Stop Module			Send the Stop request to the Module's Main.vi. If Wait for Module to stop? is TRUE, then this VI will not complete execution until the Module Main VI has stopped running. Note: If the cloneable module is running as singleton, then the 'Wait for Module to stop?' input is ignored... this VI will always wait until a cloneable Main VI running as singleton has stopped running. Note: This VI was modified by the Validate DQMH Module tool to upgrade it to the DQMH 6.0 approach to poll the execution state of a cloneable module running as singleton to know when the module has gone idle. Note: This VI was modified by the Validate DQMH Module tool to upgrade it to the DQMH 5.0 approach to destroying cloneable module event references. Note: This VI was modified by the Validate DQMH Module tool to remove the Status Updated.vi subVI call.			
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.
Request UI Display			Requests another module to display its UI in the given Display Scenario: The "Stand-Alone" scenario asks the module to open its front panel as a new windows. The "Managed" scenario asks the module to broadcast a request for display which the UI Manager then processes, showing the module in its subpanel.			
Configure			Triggers the auto-configuration of the module			
Prepare			Prepares the module UI (front panel) for display			
ExampleMessage			Send a message to the module that is displayed on its front panel			
Module Did Init			No description found (add content in vi description)			
Status Updated			No description found (add content in vi description)			
Error Reported			Note: This VI was modified by the Validate DQMH Module tool to parse additional information tags out of the incoming error source string.			
Module Did Stop			No description found (add content in vi description)			
Update Module Execution Status			No description found (add content in vi description)			
System Message			No description found (add content in vi description)			

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

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

A.7.2. MODULE RELATIONSHIP

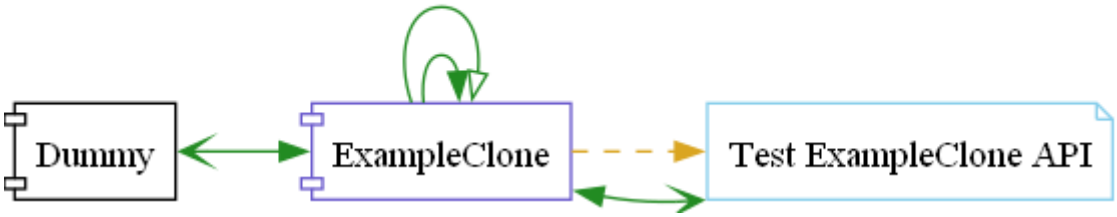


Table 44. Requests callers

Request Name	Callers
Configure	Dummy.lvlib:Main.vi Test ExampleClone API.vi
ExampleMessage	Dummy.lvlib:Main.vi Test ExampleClone API.vi
Hide Panel	Test ExampleClone API.vi
Prepare	Test ExampleClone API.vi
Request UI Display	Dummy.lvlib:Main.vi Test ExampleClone API.vi
Show Diagram	Dummy.lvlib:Main.vi Test ExampleClone API.vi
Show Panel	Test ExampleClone API.vi

Table 45. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test ExampleClone API.vi
Module Did Init	Test ExampleClone API.vi
Module Did Stop	Test ExampleClone API.vi
Status Updated	Test ExampleClone API.vi
System Message	Test ExampleClone API.vi
Update Module Execution Status	Test ExampleClone API.vi

Table 46. Used requests

Module	Requests
ExampleClone.lvlib	Stop Module.vi

Table 47. Registered broadcast

Module	Broadcasts
□—□	□—□

A.7.3. MODULE START/STOP CALLS

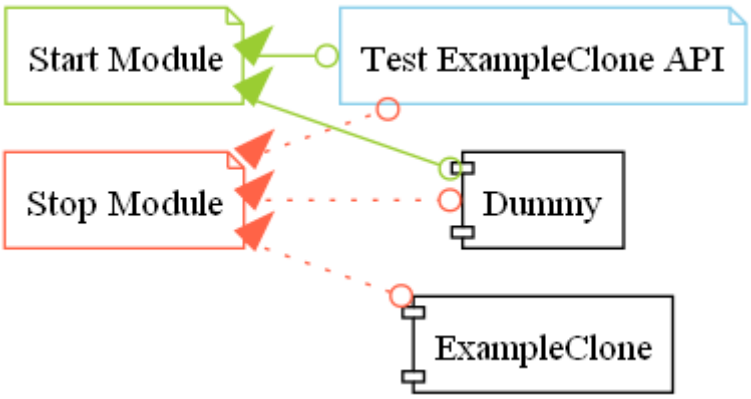


Table 48. Start and Stop module callers

Function	Callers
Start Module	Dummy.lvlib:Main.vi Test ExampleClone API.vi
Stop Module	Dummy.lvlib:Main.vi ExampleClone.lvlib:Handle Exit.vi Test ExampleClone API.vi

A.7.4. MODULE CUSTOM ERRORS

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

Module ExampleClone.lvlib use the following custom errors:

Table 49. 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	The Stop Module VI for the %s module timed out while waiting for the module main VI to stop. The module main VI may still be running.
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.

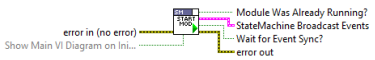
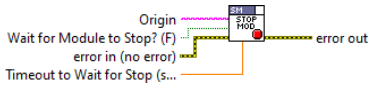
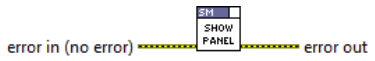
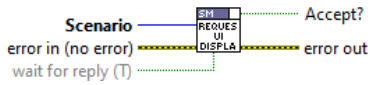
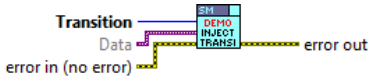
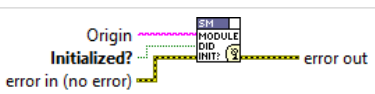
A.8. STATEMACHINE.LVLIB

Type: Singleton

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

A.8.1. EVENT LIST

Table 50. Events

Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			
Stop Module			Send the Stop request to the Module's Main.vi. If Wait for Module to Stop? is TRUE, this VI will wait until the module main VI stops, and will timeout at the Timeout to Wait for Stop value. This value defaults to "-1", which means the VI will not timeout, and will always wait until the module main VI stops before completing execution. Note: The Timeout to Wait for Stop value is ignored if 'Wait for Module to Stop?' is set to FALSE.			
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.			
Get Module Execution Status			Fire the Get Module Execution Status request.			
Show Diagram			This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			
Configure			Triggers the auto-configuration of the module.			
Prepare			Prepares the module for displaying its front panel.			
Request UI Display			Requests the module to display its UI as specified in Scenario: "managed" => in the UI Manager's subpanel "stand-alone" => as a separate window			
DEMO Inject Transition			Triggers a transition via the public API. This request serves the purpose of testing/show-casing the state machine. By design, transitions should not be triggered from outside the DQMH module (i.e. via the public API)			
Module Did Init			Send the Module Did Init event to any VI registered to listen to this module's broadcast events.			

Name	Type	Connector pane	Description	S.	R.	I.
Status Updated		Status, error in (no error), STATUS UPDT, error out	Send the Status Updated event to any VI registered to listen to events from the owning module.			
Error Reported		Error, Additional Information, error in (no error), ERROR RPRT, error out	Note: This VI was modified by the Validate DQMH Module tool to parse additional information tags out of the incoming error source string.			
Module Did Stop		Origin, error in (no error), MODULE DID STOP, error out	Send the Module Did Stop event to any VI registered to listen to this module's broadcast events.			
Update Module Execution Status		Running?, error in (no error), MODULE EXEC STAT, error out	Broadcast event to specify whether or not the module is running.			
System Message		Sys. Msg. Source, Identifier, Payload, error in (no error), SYSTEM MESS, error out	Broadcasts a "System Message" consisting of an Identifier (string), a Payload (variant) and a Source (enum). Source values are: - "module": A broadcast from within a module itself - "application": A broadcast generated from outside a module - "network": A broadcast sent/received via network			
DEMO Updated UI State		State, error in (no error), DEMO UPDA UI, error out	Broadcasts whenever the "Update UI State" private request was executed after a state change			
Exit EHL		error in (no error), EXIT EHL, error out	this event will stop the event handling loop			

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

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

A.8.2. MODULE RELATIONSHIP

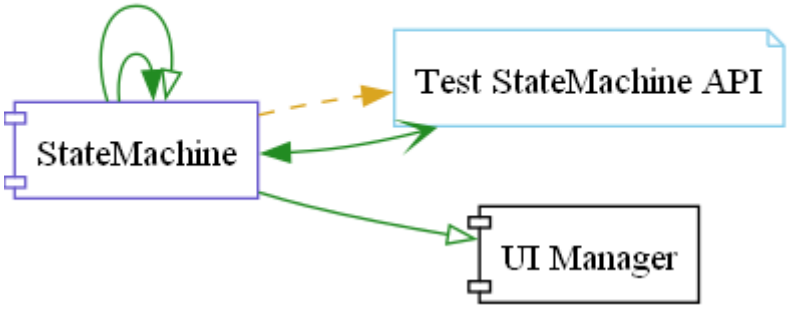


Table 51. Requests callers

Request Name	Callers
Configure	Test StateMachine API.vi
DEMO Inject Transition	Test StateMachine API.vi
Exit EHL	StateMachine.lvlib:Main.vi
Get Module Execution Status	StateMachine.lvlib:Obtain Broadcast Events for Registration.vi StateMachine.lvlib:Start Module.vi
Hide Panel	Test StateMachine API.vi
Prepare	Test StateMachine API.vi
Request UI Display	Test StateMachine API.vi
Show Diagram	Test StateMachine API.vi
Show Panel	Test StateMachine API.vi

Table 52. Broadcasts Listeners

Broadcast Name	Listeners
DEMO Updated UI State	Test StateMachine API.vi
Error Reported	Test StateMachine API.vi
Module Did Init	Test StateMachine API.vi
Module Did Stop	Test StateMachine API.vi
Status Updated	Test StateMachine API.vi
System Message	Test StateMachine API.vi
Update Module Execution Status	Test StateMachine API.vi

Table 53. Used requests

Module	Requests
StateMachine.lvlib	Exit EHL.vi Stop Module.vi
UI Manager.lvlib	Set Window Closeable State.vi (2) Shutdown Application.vi

Table 54. Registered broadcast

Module	Broadcasts
□—□	□—□

A.8.3. MODULE START/STOP CALLS

Table 55. Start and Stop module callers

Function	Callers
Start Module	StateMachine.lvlib:Load Module.vi Test StateMachine API.vi
Stop Module	StateMachine.lvlib:Handle Exit.vi Test StateMachine API.vi

A.8.4. MODULE CUSTOM ERRORS

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

Module StateMachine.lvlib use the following custom errors:

Table 56. Custom errors

Name	Code	Description
Module Not Running	403681	%s Module is not running.
Module Not Stopped	403682	The Stop Module VI for the %s module timed out while waiting for the module main VI to stop. The module main VI may still be running.
Module Not Synced	403683	%s Module was unable to synchronize events.
Request and Wait for Reply Timeout	403686	%s

APPENDIX B: LIBRARIES

Misc. reuse libraries

B.1. HSE-DB-ADO.LVLIB

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

Version: 1.0.0.0

Table 57. Nested libraries

Name	Type
DB-ADO.lvclass	LVClass
ADO-DB-Driver.lvlib	Library

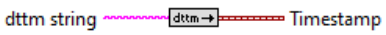
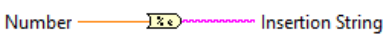
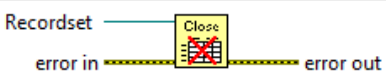
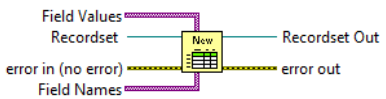
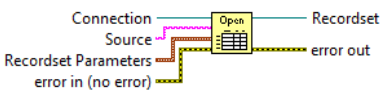
This library has no functions set to non private scope.

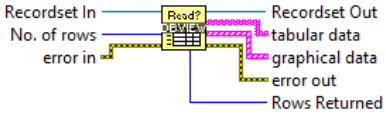
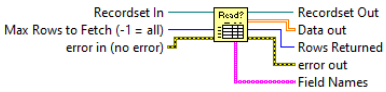
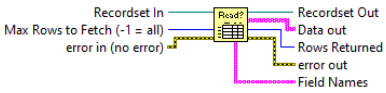
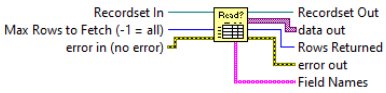
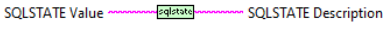
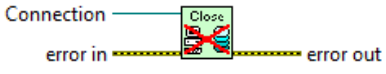
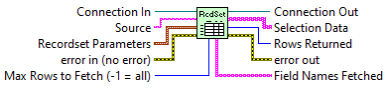
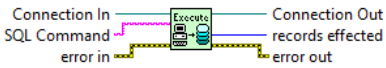
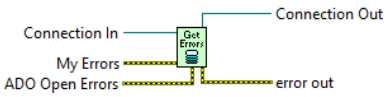
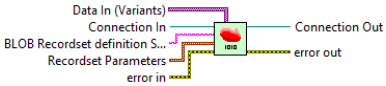
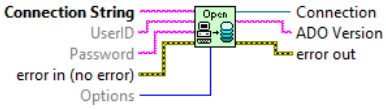
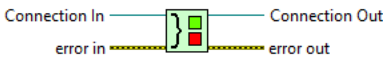
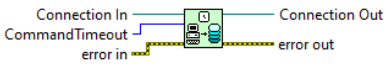
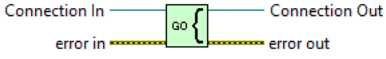
B.2. ADO-DB-DRIVER.LVLIB

Responsibility: ADO-DB driver.

Version: 1.0.0.0

Table 58. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
convert '' to NULL		Convert an empty string (two quotes) to NULL			
Convert from date-first Timestamp		Convert "MM/DD/YYYY HH:MM:SS" to timestamp			
Convert to date-first Timestamp		Convert timestamp to "MM/DD/YYYY HH:MM:SS"			
format floats for database		Format float for database (either engineering format or NULL)			
format floats[] for database	 for database.vi]	Format array of float for database (either engineering format or NULL)			
Close Recordset+		Close the recordset			
Create New Record in Recordset		Create new recordset			
Open Recordset+		Open a recordset			

Name	Connector pane	Description	S.	R.	I.
parse field names from SELECT statement		Parse a select statement into an array of variant fields			
Read Recordset (DBVIEW)		Read a recordset and return an array of DBVIEW			
Read Recordset (DOUBLE)		Read a recordset and return an array of double			
Read Recordset (STRING)		Read a recordset and return an array of string			
Read Recordset (VARIANT)		Read a recordset and return an array of variants			
SQLSTATE Lookup		Look up a SQL State code			
_Database Driver Catalog		This VI contains a list of available API functions			
Close Connection+		Close the connection			
Create and Read Recordset		Create and read a recordset			
Execute SQL Command (no data returned)		Execute a SQL command without returning any data			
Get Database Errors		Get database errors			
Get Table Info		Get table info			
Insert BLOB data		Insert BLOB data			
Open Connection+		Open a connection to the database			
Rollback Transaction on Error		Rollback the transaction			
Set Command Timeout		Set the command timeout			
Start Transaction		Start a transaction			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

B.3. HSE-DB-MYSQL.LVLIB

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

Version: 1.0.0.0

Table 59. Nested libraries

Name	Type
DB-MySQL.lvclass	LVClass

This library has no functions set to non private scope.

B.4. HSE-DB-SQLITE.LVLIB

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

Version: 1.0.0.0

Table 60. Nested libraries

Name	Type
DB-SQLite.lvclass	LVClass

This library has no functions set to non private scope.

B.5. HSE-DB.LVLIB

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

Version: 1.0.0.0

Table 61. Nested libraries

Name	Type
DB-Interface.lvclass	LVClass
[DB_CONNECTOR.lvlib]	Library
[VI Reference Management.lvlib]	Library
[Clone Registration.lvlib]	Library

Table 62. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Test DB_CONNECTOR API		DB_CONNECTOR API Tester.			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

B.6. HSE-CONFIG.LVLIB

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

Version: 1.0.0.0

Table 63. Nested libraries

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

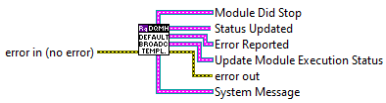
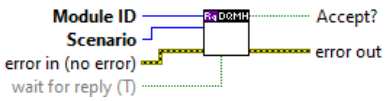
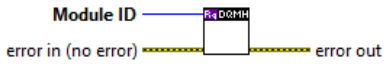
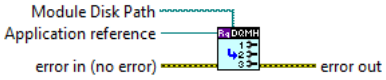
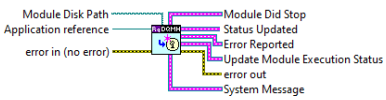
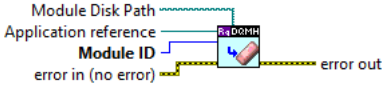
This library has no functions set to non private scope.

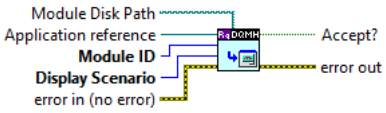
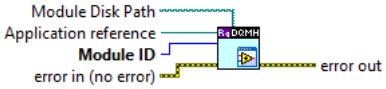
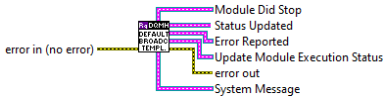
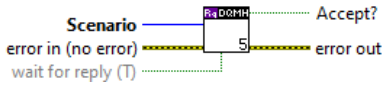
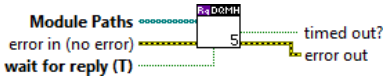
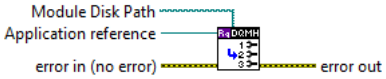
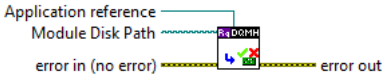
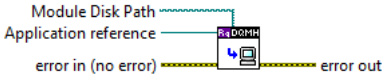
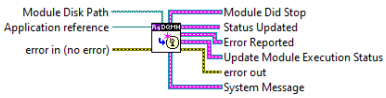
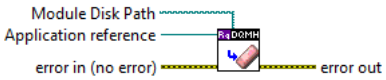
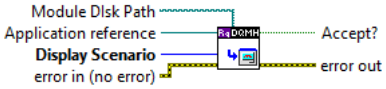
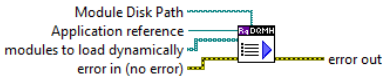
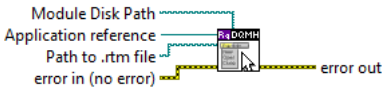
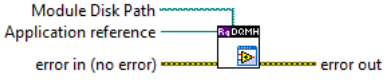
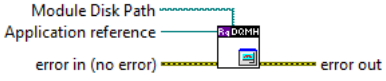
B.7. HSE-DQMH-DYNAMICREQUESTERS.LVLIB

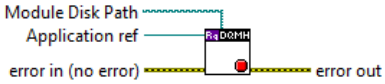
Responsibility: No description found (add content in lvlib description)

Version: 1.0.0.0

Table 64. 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 path			
DQMH Obtain Default Broadcast Events (Cloneable)		Calls the "Obtain Default Broadcast Events" request VI of the module in path			
DQMH Prepare (Cloneable)		Calls the "Prepare" request VI of the module in path			

Name	Connector pane	Description	S.	R.	I.
DQMH Request UI Display (Cloneable)		Calls the "Request UI Display" request VI of the module in Path to module directory. Hands over the Module ID and the Display Scenario.			
DQMH Show Diagram (Cloneable)		Calls the "Request UI Display" request VI of the module in Path to module directory. Hands over the Module ID and the Display Scenario.			
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 path			
DQMH Load API Tester		Calls the "Load Module" request VI of the module in path			
DQMH Load Module		Calls the "Load Module" request VI of the module in path			
DQMH Obtain Default Broadcast Events		Calls the "Obtain Default Broadcast Events" request VI of the module in path			
DQMH Prepare		Calls the "Prepare" request VI of the module in path			
DQMH Request UI Display		Calls the "Request UI Display" request VI of the module in Path to module directory. Hands over the Module Name and the Display Scenario.			
DQMH Set Modules		Calls the "Set Modules" request VI of the module in Path to module directory. Hands over paths to all dynamically loaded modules in modules to load dynamically.			
DQMH Set Runtime Menu		Calls the "Set Runtime Menu" request VI of the module in Path to module directory. Hands over the Path to .rtm file.			
DQMH Show Diagram		Calls the "Request UI Display" request VI of the module in Path to module directory. Hands over the Module Name and the Display Scenario.			
DQMH Show Panel		Calls the "Show Panel" request VI of the module in Path to module directory			

Name	Connector pane	Description	S.	R.	I.
DQMH Stop Module		Calls the "Stop Module" request VI of the module in Path to module directory			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

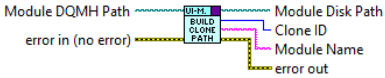
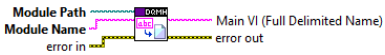
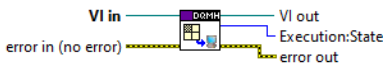
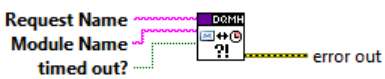
Inlining: → Inlined

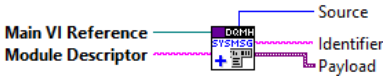
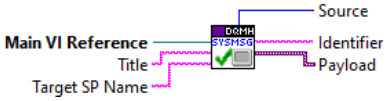
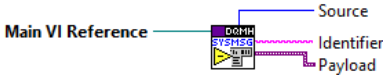
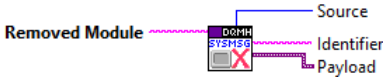
B.8. HSE-DQMH.LVLIB

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

Version: 1.0.0.0

Table 65. 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 Module Path		→	
DQMH Load Main VI Reference		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 circumevent a bug in LabVIEW. 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 https://forums.ni.com/t5/Delacor-Toolkits-Discussions/Deploy-and-run-at-Startup-for-RT-systems/m-p/3620339/highlight/true#M256). 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		→	
DQMH Request Reply Timed Out—error		No description found (add content in vi description)		→	

Name	Connector pane	Description	S.	R.	I.
DQMH System Message - Add to Run-Time Menu		Sends the modul's Path and Module Descriptor 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.			
DQMH Tester Prepare hse-appl - Get Name and Path		Returns APP-NAME as Project Name and /APP-NAME_Source as Project Path 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 REAL-TIME: As the configuration directory on real-time systems always needs to reside at "C:\<Project Name>_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.			

Name	Connector pane	Description	S.	R.	I.
DQMH Tester Prepare hse-appl		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. 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 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. REAL-TIME: As the configuration directory on real-time systems always needs to reside at "C:\<Project Name>_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. If this VI is used outside of the normal application scope (e.g. in a unit test with a seperate LV project) you can provide the absolute path to the app source folder to "RT App Name or Path".			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

B.9. 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.

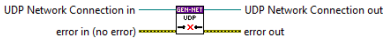
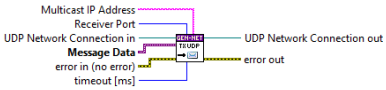
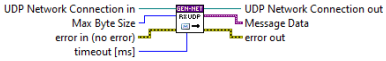
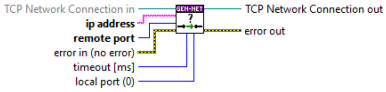
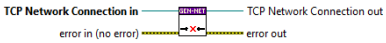
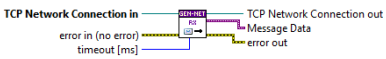
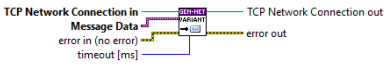
The Delacor Queued Message Handler (DQMH) reference design is provided by Delacor, an NI Alliance Partner. The DQMH is available for download from the LabVIEW Tools Network. You can find more information on the Delacor Queued Message Handler (DQMH) at http://delacor.com/products/dqmh/.

Version: 1.0.0.0

Table 66. Nested libraries

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

Table 67. 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 lenght 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.			
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 lenght 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.			

Name	Connector pane	Description	S.	R.	I.
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.10. HSE-MISC.LVLIB

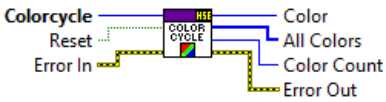
Responsibility: source code password: bowman-tyro-kickback-besides

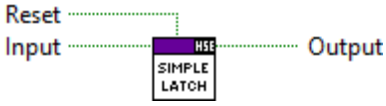
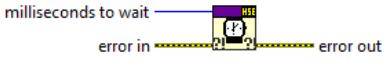
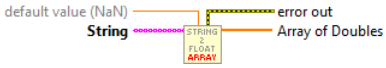
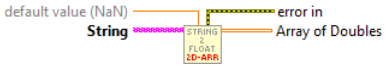
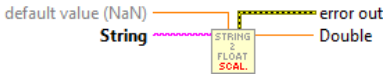
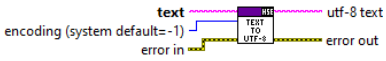
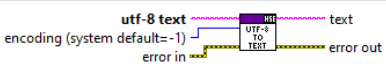
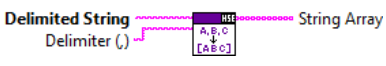
Version: 1.0.0.0

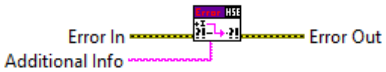
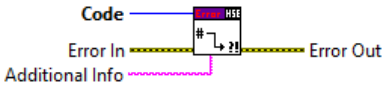
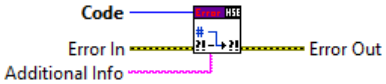
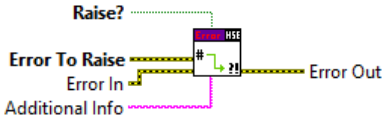
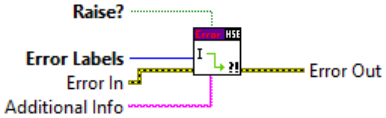
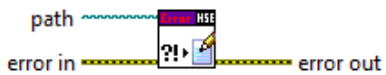
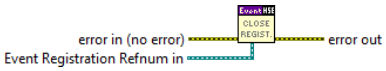
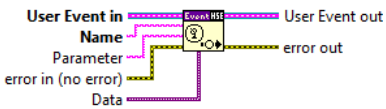
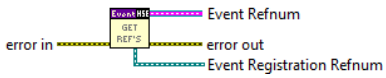
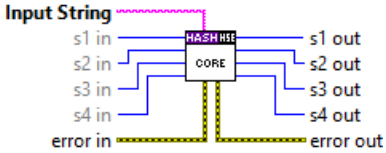
Table 68. Nested libraries

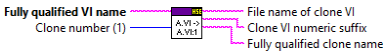
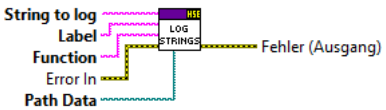
Name	Type
Loop Timer.lvclass	LVClass

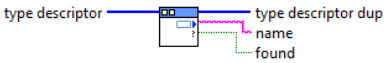
Table 69. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
ColorCycle		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. This Vi is useful to give plots and graphs better looking colors. The color sets are inspired by a subset of the colormaps from the Python plotting library Matplotlib.			
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.)			

Name	Connector pane	Description	S.	R.	I.
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)			
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 (https://github.com/LabVIEW-Open-Source/DataManipulation).			
Variant_EmptyCluster		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin (https://github.com/LabVIEW-Open-Source/DataManipulation).			
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).			

Name	Connector pane	Description	S.	R.	I.
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 Additional Info to the source of Error In			
Error_AppendErrorsToSource		Takes the first element of errors in and concatenates all other elements' code and source into the source of the first error.			
Error_Clear		Clears the error in error in			
Error_Helper_BuildCluster		Builds an error cluster from Code and Additional Info			
Error_Helper_OverwriteCluster		If Error In is true, overwrites the error cluster information with Code and Additional Info.			
Error_Helper_RaiseError		If Raise? is true, puts the error in Error To Raise on the error output and adds Additional Info to the source of the error.			
Error_Helper_RaiseErrorFromLabel		If Raise? is true, sets an error with code set by Error Labels and source by Additional Info			
Error_LogToFile		If error in is true, writes the error to the file identified by path and clears the error.			
Event_CloseRegistrationRef		Unregisters the given event registration from the HSE-Event			
Event_Generate		Generates an HSE-Event and sends Name, Parameter and Data 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					

Name	Connector pane	Description	S.	R.	I.
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 Search parameters and by Sort Order.			
String_PadWithCharacters		Adds char (ASCII) characters to str in until it is length characters long. Common ASCII characters: 0x09 ... tab 0x20 ... space 0x2E ... dot (.)			
String_StripNullValues		Removes all NULL values from a string			
Find Running VIs		No description found (add content in vi description)			
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		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. 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.			
ShowRunningVIs		Returns a list of VIs in memory			
StringLogger		Simple helper VI for writing data to a log file. Path Data and Label form the folder structure, and Function is part of the file name.			

Name	Connector pane	Description	S.	R.	I.
TypeDescriptor_GetName		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin (https://github.com/LabVIEW-Open-Source/DataManipulation).			
TypeDescriptor_GetPString		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin (https://github.com/LabVIEW-Open-Source/DataManipulation).			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

B.11. HSE-NETWORK.LVLIB

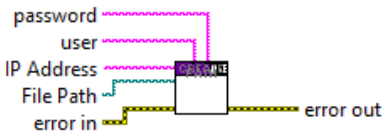
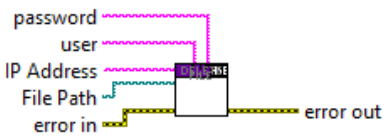
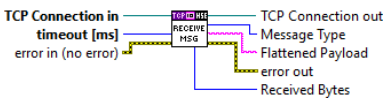
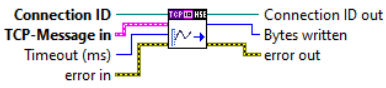
Responsibility: No description found (add content in lvlib description)

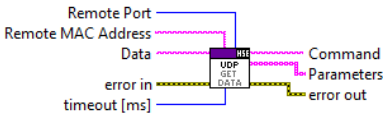
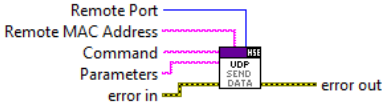
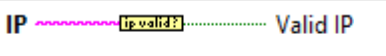
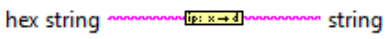
Version: 1.0.0.0

Table 70. Nested libraries

Name	Type
NetStream.lvclass	LVClass

Table 71. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
FTP_CreateRemotePath					
FTP_RemoveRemoteFile					
TCP Receive Message					
TCP Send Message		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:UDPReceiveDataViaSystemEvent.vi]				
UDP__Send	[hse-network.lvlib:UDPSend.vi]				

Name	Connector pane	Description	S.	R.	I.
UDP__TransmitData	[hse-network.lvlib:UDPTransmitData.vi]				
UDP_GetDataFromDevice					
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

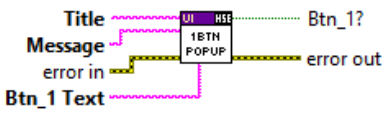
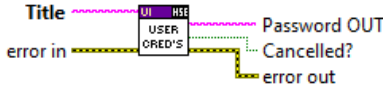
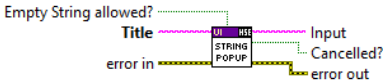
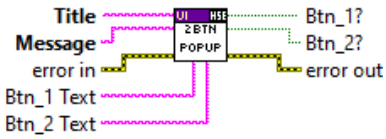
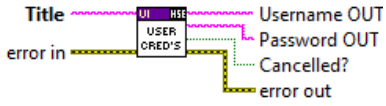
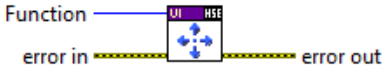
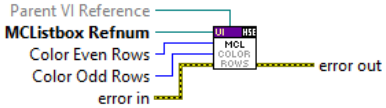
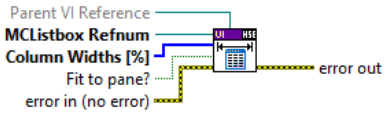
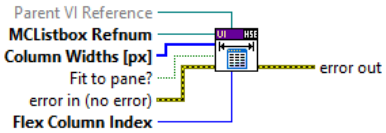
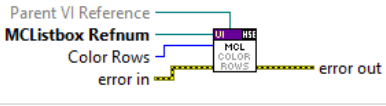
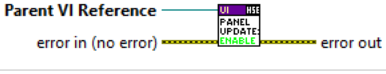
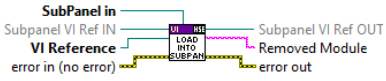
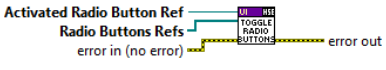
B.12. HSE-UI.LVLIB

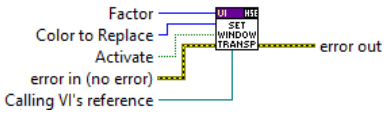
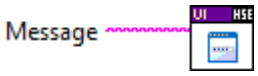
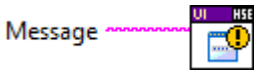
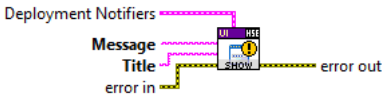
Responsibility: No description found (add content in lvlib description)

Version: 1.0.0.0

Table 72. 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 Parent VI Reference is supplied, panel updates are deferred.			
MultiColumnListbox_Resize		Resizes the columns of a MCLB according to the widths given in Column Widths [%]. If Parent VI Reference is supplied, panel updates are deferred.			
MultiColumnListbox_Resize_Absolute		Resizes the columns of a MCLB according to the widths given in Column Widths [px].The column with the index in Flex Column Index uses the remaining space. If Parent VI Reference is supplied, panel updates are deferred.			
MultiColumnListbox_UnColorRows		Colors the rows of a MCLB in alternate colors. If Parent VI Reference is supplied, panel updates are deferred.			
PanelUpdates_Defer					
PanelUpdates_Enable					
Subpanel - Load VI		Opens the VI reference to Full Delimited Name and inserts it into SubPanel in. The reference of the inserted VI is returned in Subpanel VI Ref OUT. 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.			
Toggle Radio Buttons		No description found (add content in vi description)			

Name	Connector pane	Description	S.	R.	I.
Window Color to Transparent					
Window Handle		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.			
ProgressPopup					
ProgressPopup_Close		Closes the modal progress window.			
ProgressPopup_Show		Shows a modal window with an animated progress bar, indicating that some (background) process is running. The Title of the window and the Message being displayed can be specified.			
ProgressPopup_Update		Closes the modal progress window.			
ProgressPopupWithStatus					
ProgressPopupWithStatus_Close		Closes the modal progress window.			
ProgressPopupWithStatus_Show		Shows a modal window with an animated progress bar, indicating that some (background) process is running. The Title of the window and the Message being displayed can be specified.			
HSE_AboutScreen					
Screen_ShowHseAbout					
Screen_ShowProjectAbout					

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

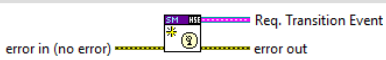
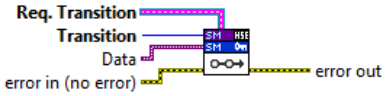
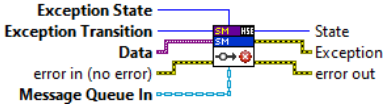
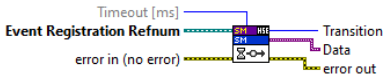
Inlining: → Inlined

B.13. HSE-STATE-MACHINE.LVLIB

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

Version: 1.0.0.0

Table 73. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
SM Create Event		Creates the local user event used for requesting a transition.			
SM Destroy Event		Destroys the local user event used for requesting a transition.			
SM Request Transition		Sends a Transition to the State Machine which will react dependent on it's state.			
SM Polling - Leave State if FALSE		Keep polling if the boolean condition is TRUE			
SM Polling - Leave State if TRUE		Keep polling if the boolean condition is TRUE			
SM DEMO		Demonstrates the use of the HSE-State Machine and can be used as a Copy and Paste Template.			
SM Process Exception Transition		If an error occurs, go to the "Erroring" state and send an update to the UI			
SM Update UI State		Propagate state change to UI. HSE: This is only a place holder, in DQMH modules this would use the Message Queue. Implement your own communication mechanism here.			
SM Wait for Transition		Waits for a Transition to occur in the duration of Timeout.		S	

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

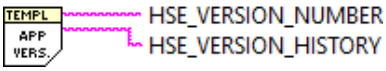
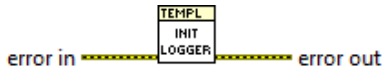
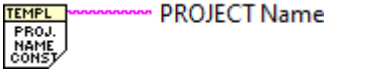
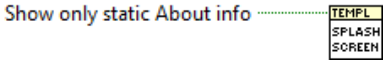
Inlining: → Inlined

B.14. PROJECT.LVLIB

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

Version: 1.0.0.0

Table 74. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
PROJECT_ApplicationVersion—constant		Version number of the application. This is set automatically during build.			
PROJECT_Evaluate Default Menu Selection		No description found (add content in vi description)			
PROJECT_InitLogging		Initiate the logging functions.			
PROJECT_Layout-VI		This is the default layout VI for the HSE UI Framework. It features three areas: - header (contains the "SP_Header" subpanel) - navigation (contains the "SP_Navigation" subpanel) - content (contains the "SP_Content" subpanel) This VI is loaded by the UI Manager module, the subpanels are then populated with DQMH modules as configured in the UI Manager's configuration file.			
PROJECT_Name—constant		Constant VI defining the name of the Project. This influences directory structure and other things.			
PROJECT_SplashScreen		No description found (add content in vi description)			
PROJECT_UserCredentials		No description found (add content in vi description)			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

APPENDIX C: CLASSES

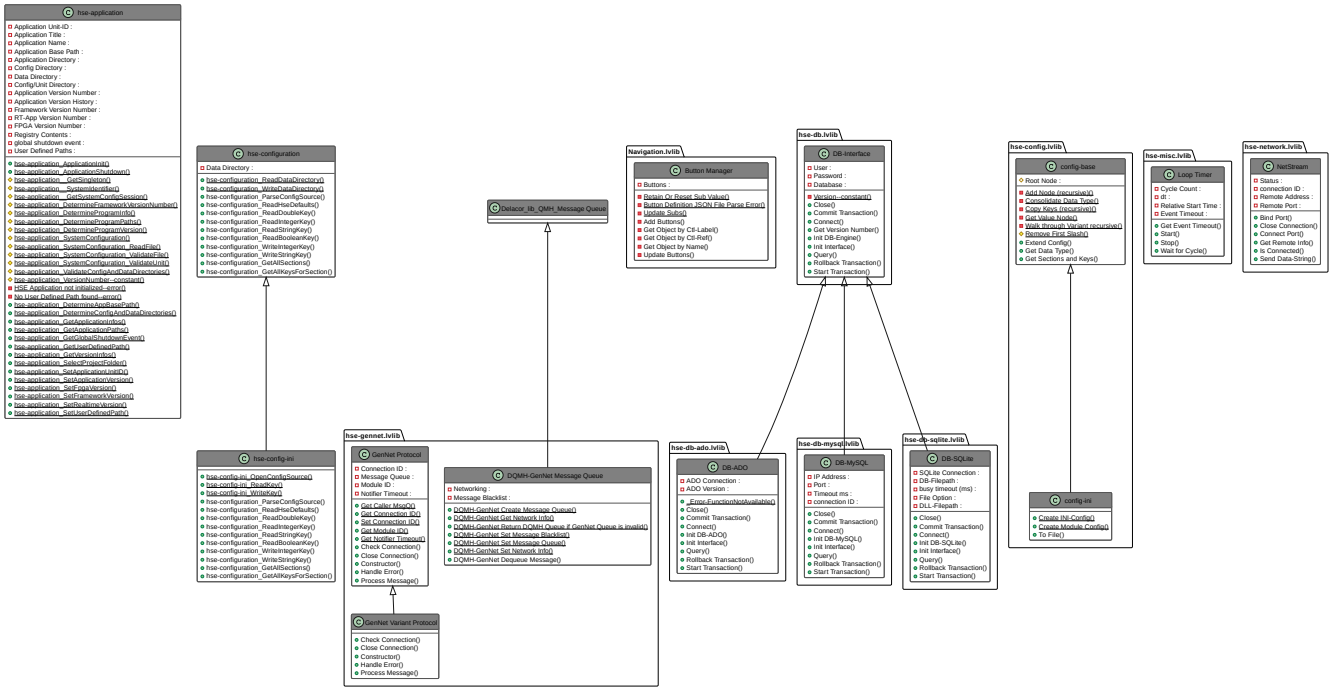
LabVIEW Classes

C.1. CLASSES OVERVIEW

This project contains 15 classes and 0 interface.

Table 75. Classes list

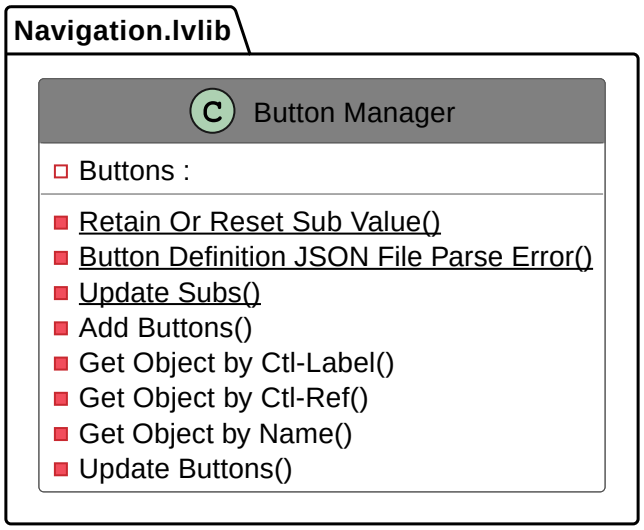
Classes	Interfaces
Button Manager.lvclass	
DB-ADO.lvclass	
DB-MySQL.lvclass	
DB-SQLite.lvclass	
DB-Interface.lvclass	
[hse-application.lvclass]	
[hse-config-ini.lvclass]	
[hse-configuration.lvclass]	
[config-base.lvclass]	
[config-ini.lvclass]	
GenNet Protocol.lvclass	
GenNet Variant Protocol.lvclass	
DQMH-GenNet Message Queue.lvclass	
Loop Timer.lvclass	
NetStream.lvclass	



C.2. BUTTON MANAGER.LVCLASS

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

Version: 1.0.0.0



This library has no functions set to non private scope.

C.3. DB-ADO.LVCLASS

Responsibility: ADO-Driver subclass.

Version: 1.0.0.2

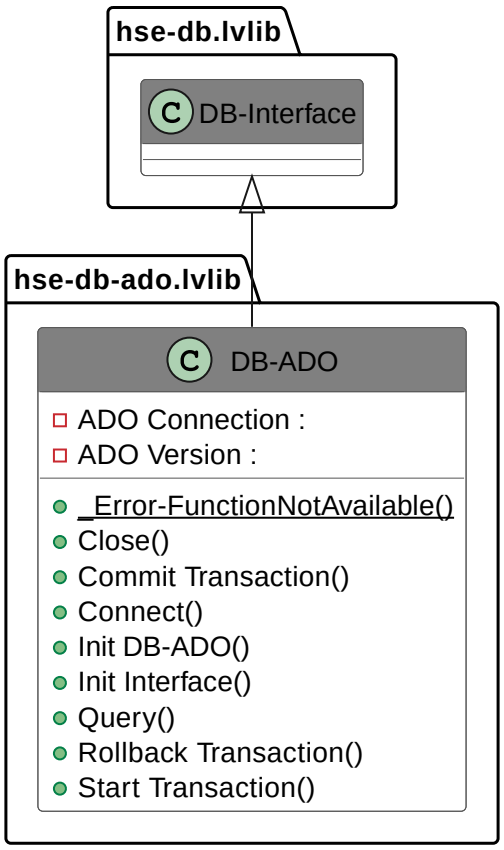


Table 76. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
_Error-FunctionNotAvailable	ADO error out	No description found (add content in vi description)			
Close	DB-ADO in, error in, ADO CLOSE, DB-ADO out, error out	Close the ADO connection.			
Commit Transaction	DB-ADO in, error in, ADO COMMIT, DB-ADO out, error out	Commit a transaction. Either all SQL-commands get commited or, in case of an error, all get rejected.			
Connect	DB-ADO in, error in, ADO CONNECT, DB-ADO out, error out	Connect to a ADO database.			
Init DB-ADO	DB-ADO in, Authentication, error in, ADO INIT, DB-ADO out, error out	Init a new ADO DB object.			
Init Interface	DB-ADO, hse-config, Config Section, error in, ADO INIT INTERFACE, DB-ADO, error out	No description found (add content in vi description)			
Query	DB-ADO in, Query, error in, ADO QUERY, DB-ADO out, Return Data, Packed Metadata, error out, Field Names	Send a SQL-query and return the answer. Return data is a 2D-array of strings wraped in variants.			
Rollback Transaction	DB-ADO in, error in, ADO ROLLBACK TRANS., DB-ADO out, error out	Rollback the active transaction.			
Start Transaction	DB-ADO in, error in, ADO START TRANSACTION, DB-ADO out, error out	Start a transaction to get sure all following SQL commands get executed or none.			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.4. DB-MYSQL.LVCLASS

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

Version: 1.0.0.0

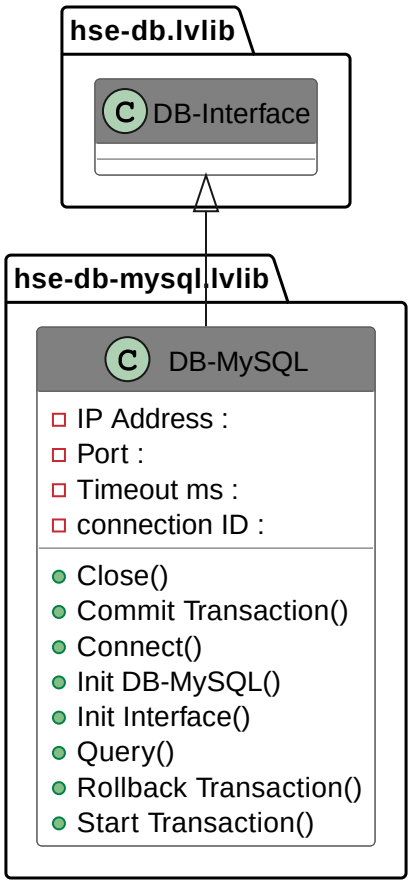
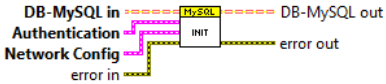
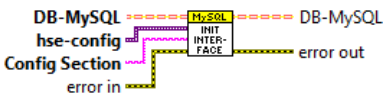
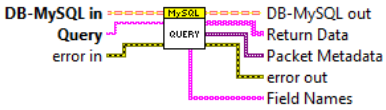
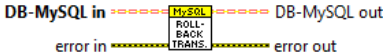


Table 77. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Close		No description found (add content in vi description)			
Commit Transaction		Commit a transaction. Either all SQL-commands get commited or, in case of an error, all get rejected.			
Connect		No description found (add content in vi description)			
Init DB-MySQL		No description found (add content in vi description)			

Name	Connector pane	Description	S.	R.	I.
Init Interface		No description found (add content in vi description)			
Query		No description found (add content in vi description)			
Rollback Transaction		Rollback the active transaction.			
Start Transaction		Start a transaction to get sure all following SQL commands get executed or none.			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.5. DB-SQLITE.LVCLASS

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

Version: 1.0.0.1

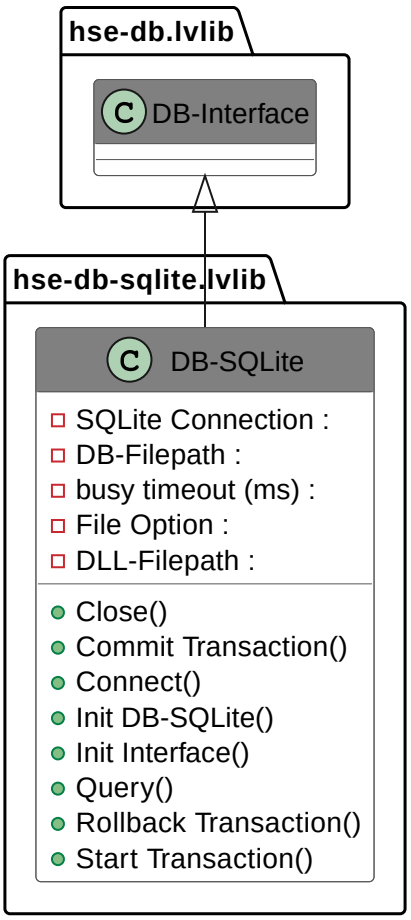
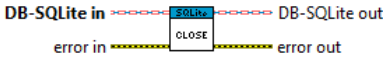
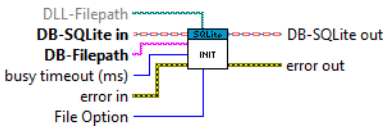
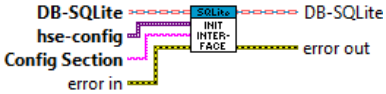
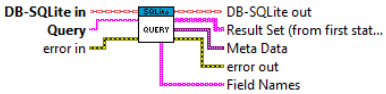
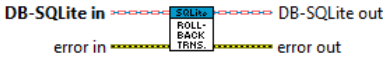


Table 78. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Close		No description found (add content in vi description)			
Commit Transaction		No description found (add content in vi description)			
Connect		No description found (add content in vi description)			
Init DB-SQLite		No description found (add content in vi description)			
Init Interface		No description found (add content in vi description)			
Query		No description found (add content in vi description)			
Rollback Transaction		Rollback the active transaction.			
Start Transaction		No description found (add content in vi description)			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.6. DB-INTERFACE.LVCLASS

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

Version: 1.0.0.0

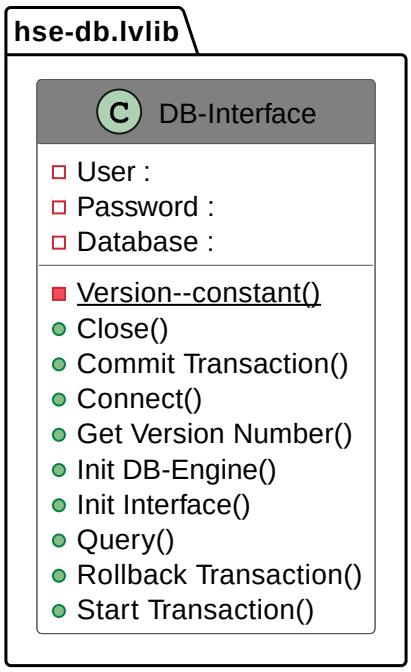
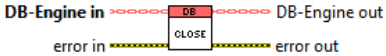
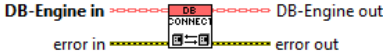
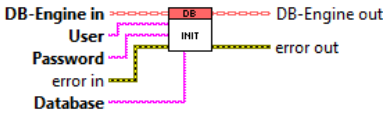
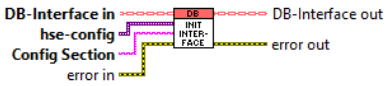
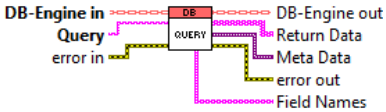
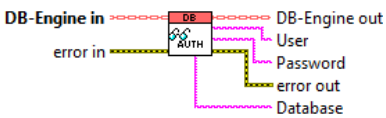
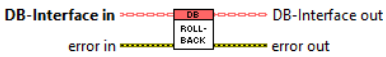
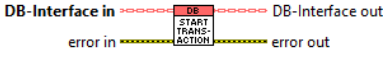


Table 79. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Close		Close connection. -- This Method is just a prototype --			
Commit Transaction		Commit a transaction. Either all SQL-commands get commited or, in case of an error, all get rejected.			
Connect		Connect. -- This method is just a prototype --			
Get Version Number		No description found (add content in vi description)			
Init DB-Engine		Initialize the class.			
Init Interface		No description found (add content in vi description)			
Query		No description found (add content in vi description)			
Read Authentication		Returns the authentication data.			
Rollback Transaction		No description found (add content in vi description)			
Start Transaction		No description found (add content in vi description)			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.7. HSE-APPLICATION.LVCLASS

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

Version: 1.0.0.5

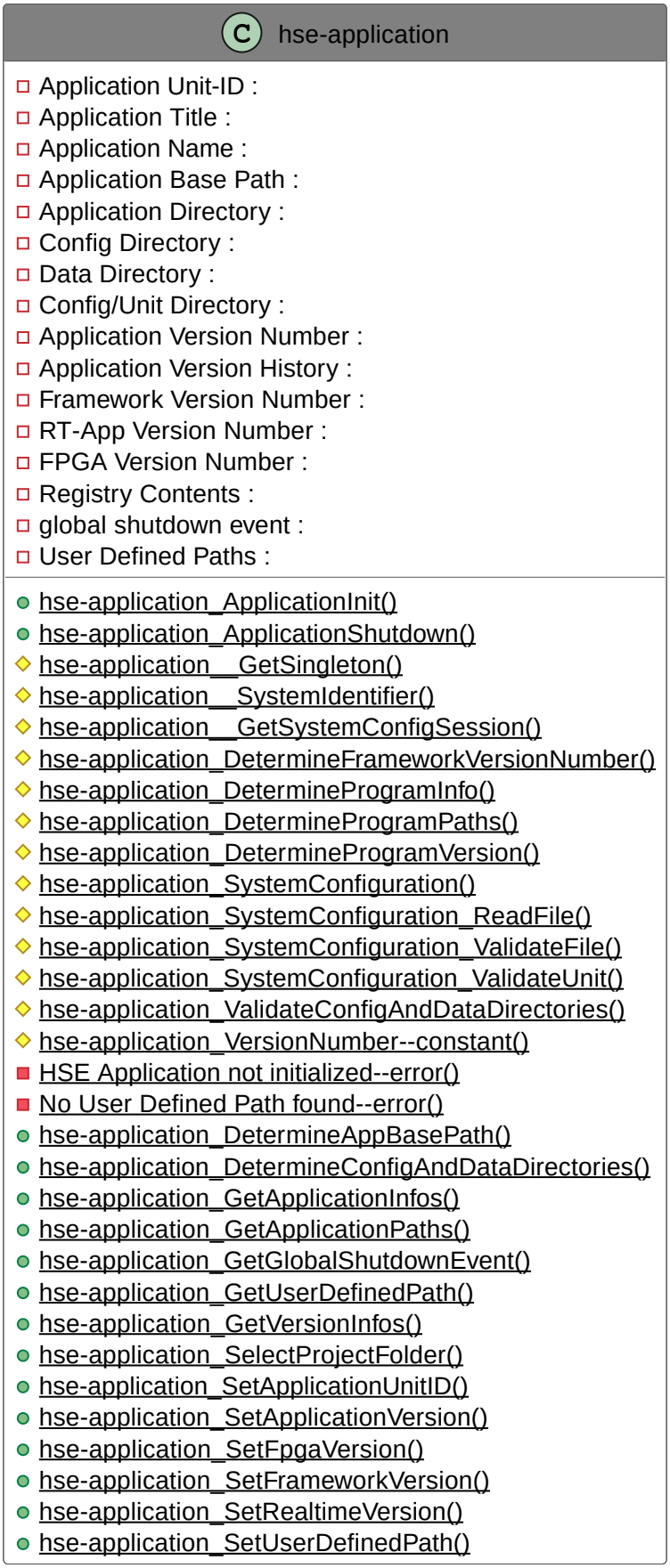
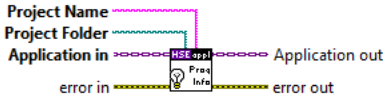
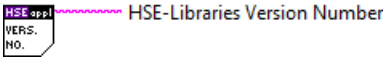
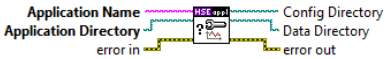
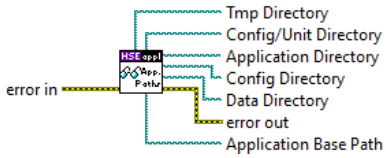
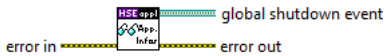
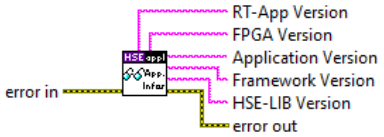
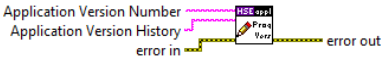
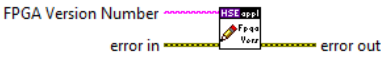
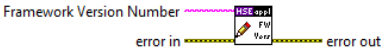
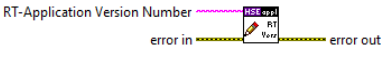


Table 80. Functions (non private scope only)

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.			
hse-application_ApplicationShutdown		Stops and frees all hse resources.			
hse-application__GetSingleton	[hse-application.lvclass:hse-applicationGetSingleton.vi]	Contains the DVR to the HSE ApplicationClass object.			
hse-application__SystemIdentifier	[hse-application.lvclass:hse-applicationSystemIdentifier.vi]				
hse-application__GetSystemConfigSession	[hse-application.lvclass:hse-applicationGetSystemConfigSession.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 Config File.			
hse-application_SystemConfiguration_ValidateFile		Check if Config File 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.			

Name	Connector pane	Description	S.	R.	I.
hse-application_SystemConfiguration_ValidateUnit		Check if Unit Directory exists.			
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 Application Base Path 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_GetUserDefinedPath		returns the user defined path with the specified name			

Name	Connector pane	Description	S.	R.	I.
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		P	
hse-application_SelectProjectFolder		Opens a file dialog to select the folder in which the project file and the startup.vi are located.			
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).			
hse-application_SetUserDefinedPath		saves a user defined path with the specified name			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.8. HSE-CONFIG-INI.LVCLASS

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

Version: 1.0.0.1

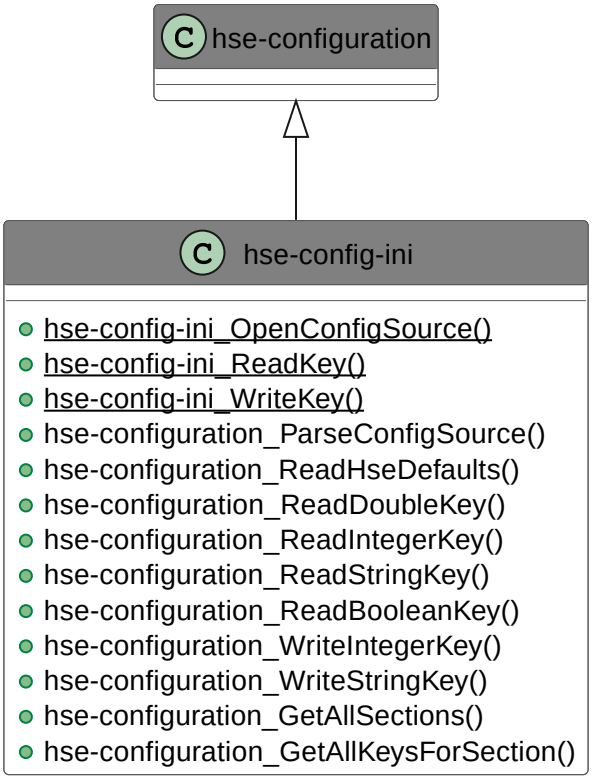
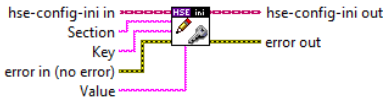
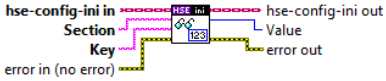
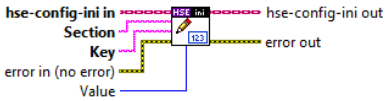
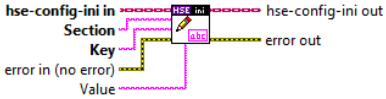


Table 81. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
hse-config-ini_OpenConfigSource		Finds the path to the Name.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_ReadHseDefaults		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 section and key from the configuration object			
hse-configuration_ReadIntegerKey		Reads the numeric configuration value (I32) identified by section and key from the configuration object			

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

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.9. HSE-CONFIGURATION.LVCLASS

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

Version: 1.0.0.1

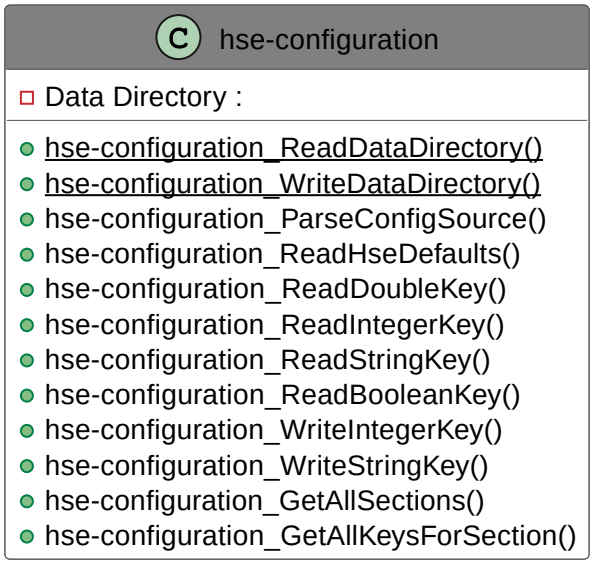
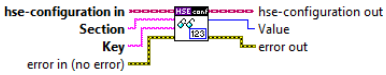
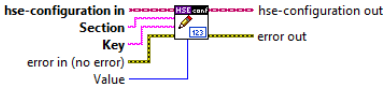
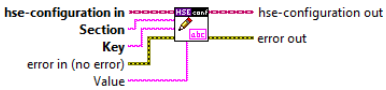


Table 82. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
hse-configuration_ReadDataDirectory		No description found (add content in vi description)		P	
hse-configuration_WriteDataDirectory		No description found (add content in vi description)		P	
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 section and key from the configuration object			
hse-configuration_ReadIntegerKey		Reads the numeric configuration value (I32) identified by section and key from the configuration object			
hse-configuration_ReadStringKey		Reads the string configuration value identified by section and key from the configuration object			
hse-configuration_ReadBooleanKey		Reads the numeric configuration value (DOUBLE) identified by section and key from the configuration object			
hse-configuration_WriteIntegerKey		Writes the string configuration value identified by section and key to the configuration object and the config source		S	
hse-configuration_WriteStringKey		Writes the string configuration value identified by section and key to the configuration object and the config source		S	
hse-configuration_GetAllSections		Reads the numeric configuration value (DOUBLE) identified by section and key from the configuration object			
hse-configuration_GetAllKeysForSection		Reads the numeric configuration value (DOUBLE) identified by section and key from the configuration object			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.10. CONFIG-BASE.LVCLASS

Responsibility: Base class for the hse-configuration.

Version: 1.0.0.0

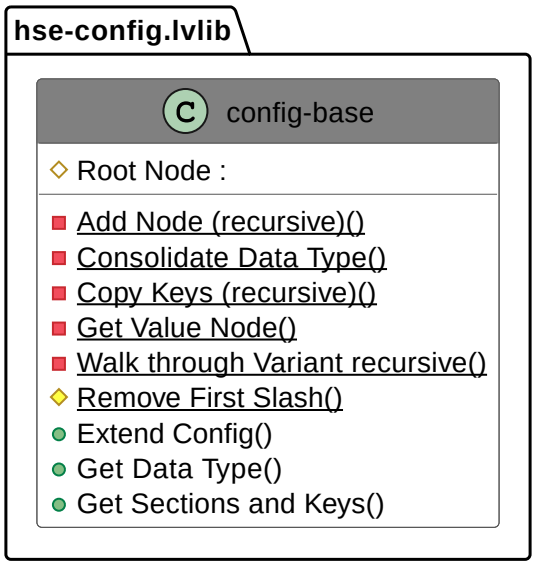
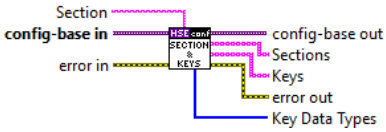
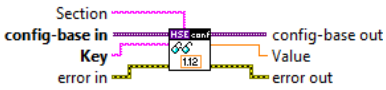
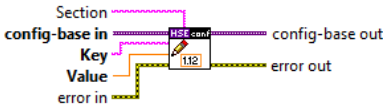
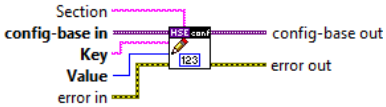
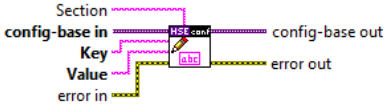


Table 83. Functions (non private scope only)

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 seperation 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.			
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.			

Name	Connector pane	Description	S.	R.	I.
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.11. CONFIG-INI.LVCLASS

Responsibility: Read and write INI-configuration files.

Version: 1.0.0.1

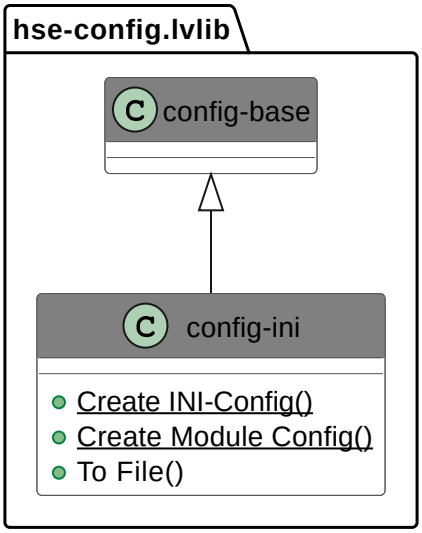


Table 84. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Create INI-Config	INI Filepath, error in, HSE CREATE, config-ini out, error out	Creates a new "config-ini" object based on the INI-file given.			
Create Module Config	DQMH Module Name, error in, HSE DQMH MODULE CONF, config-ini out, error out	Loads the INI-file of an (HSE) DQMH module.			
To File	config-ini in, Filepath, error in, HSE TO FILE, config-ini out, error out	Writes the config-ini object to an INI-file.			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.12. GENNET PROTOCOL.LVCLASS

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

Version: 1.0.0.1

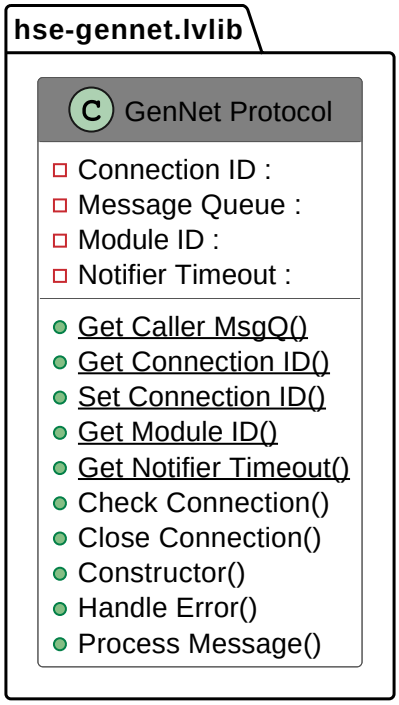
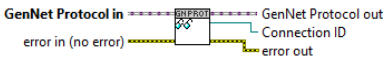
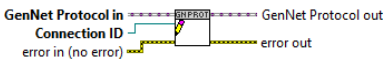
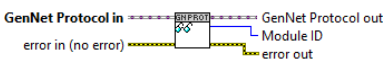
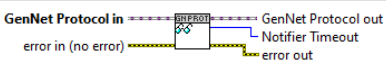
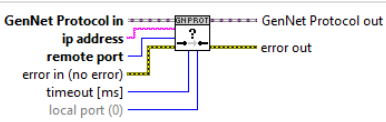
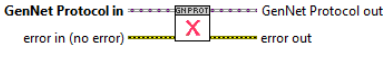
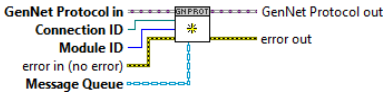
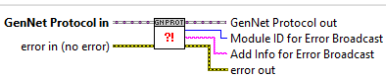
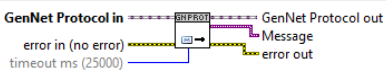
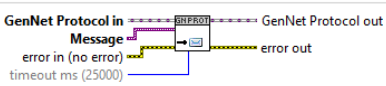


Table 85. Functions (non private scope only)

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)			
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.13. GENNET VARIANT PROTOCOL.LVCLASS

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

Version: 1.0.0.2

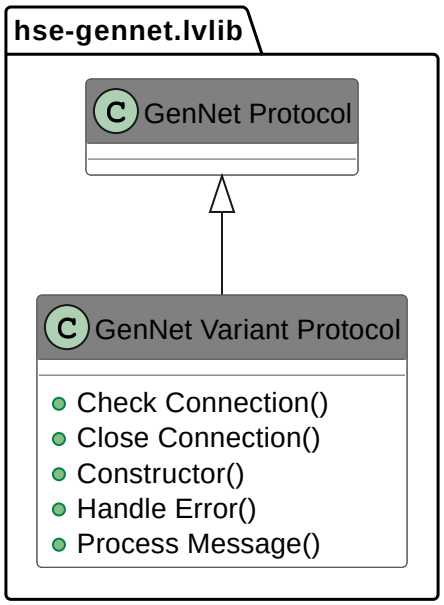
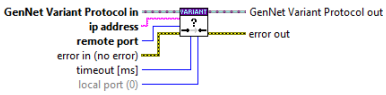
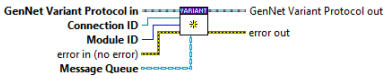
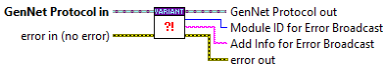
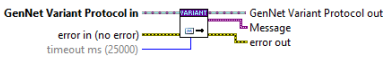
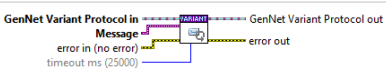


Table 86. Functions (non private scope only)

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)			
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.14. 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

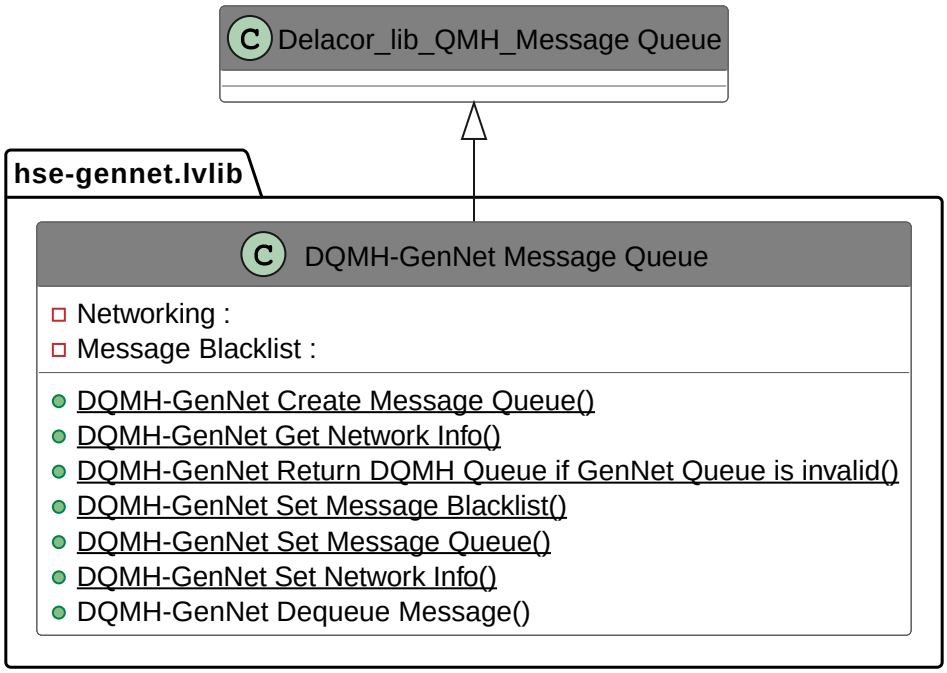
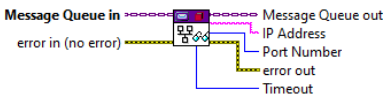
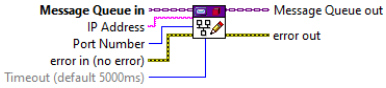


Table 87. Functions (non private scope only)

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

Name	Connector pane	Description	S.	R.	I.
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 Message Queue in and writes it to the DQMH-GenNet Message Queue			
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.15. LOOP TIMER.LVCLASS

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

Version: 1.0.0.0

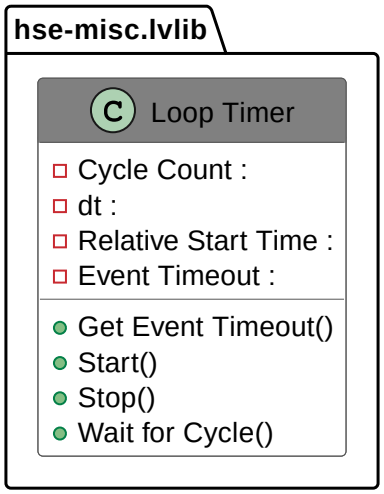
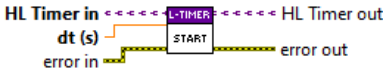
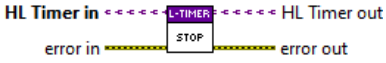
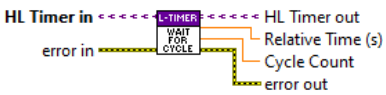


Table 88. Functions (non private scope only)

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".			

Name	Connector pane	Description	S.	R.	I.
Wait for Cycle		Waits until the next time cycle is reached.			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.16. NETSTREAM.LVCLASS

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

Version: 1.0.0.0

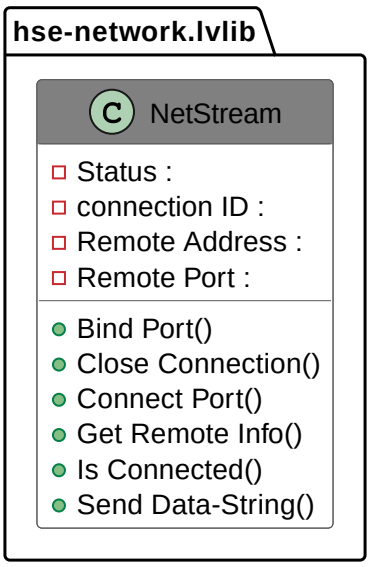
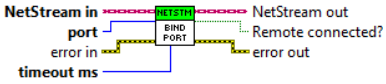
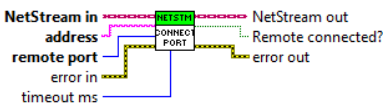
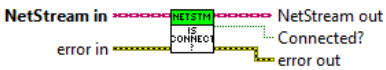
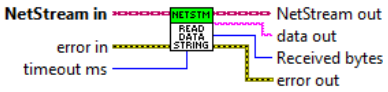
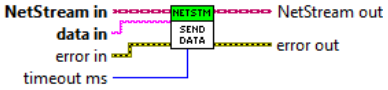


Table 89. Functions (non private scope only)

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)			
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)			

Name	Connector pane	Description	S.	R.	I.
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 90. Custom errors

Name	Code	Description	Owned by
HSE Application not initialized	0		[hse-application.lvclass]
No User Defined Path found	0		[hse-application.lvclass]
DB_CONNECTOR.lvlib: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.	[hse-db.lvlib]
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.	[GenNet-Client.lvlib] [GenNet-Server.lvlib] ExampleClone.lvlib
Module Not Running	403681	%s Module is not running.	Event Manager.lvlib Navigation.lvlib UI Manager.lvlib ActorModule.lvlib DBModule.lvlib Dummy.lvlib StateMachine.lvlib
DB_CONNECTOR.lvlib:Module Not Stopped	403682	%s Module did not finish clean up on exit.	[hse-db.lvlib]
Module Not Stopped	403682	%s Module did not finish clean up on exit.	[GenNet-Client.lvlib] [GenNet-Server.lvlib]
Module Not Stopped	403682	The Stop Module VI for the %s module timed out while waiting for the module main VI to stop. The module main VI may still be running.	Event Manager.lvlib Navigation.lvlib UI Manager.lvlib ActorModule.lvlib DBModule.lvlib Dummy.lvlib ExampleClone.lvlib StateMachine.lvlib
DB_CONNECTOR.lvlib:Module Not Synced	403683	%s Module was unable to synchronize events.	[hse-db.lvlib]

Name	Code	Description	Owned by
Module Not Synced	403683	%s Module was unable to synchronize events.	Event Manager.lvlib Navigation.lvlib UI Manager.lvlib [GenNet-Client.lvlib] [GenNet-Server.lvlib] ActorModule.lvlib DBModule.lvlib Dummy.lvlib ExampleClone.lvlib StateMachine.lvlib
DB_CONNECTOR.lvlib:Module Not Running	403684	Not a single instance of "%s" Module running.	[hse-db.lvlib]
Module Not Running	403684	Not a single instance of "%s" Module running.	[GenNet-Client.lvlib] [GenNet-Server.lvlib] ExampleClone.lvlib
DB_CONNECTOR.lvlib: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.	[hse-db.lvlib]
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.	[GenNet-Client.lvlib] [GenNet-Server.lvlib] ExampleClone.lvlib
DB_CONNECTOR.lvlib:Request Timed Out	403686	The reply for the request "%s" of the "%s" Module timed out.	[hse-db.lvlib]
DB_CONNECTOR.lvlib:Request and Wait for Reply Timeout	403686	%s	[hse-db.lvlib]
DQMH Request Reply Timed Out	403686	The '%s' request for the %s module timed out.	[hse-dqmh.lvlib]
Request Timed Out	403686	The reply for the request "%s" of the "%s" Module timed out.	[GenNet-Client.lvlib]
Request and Wait for Reply Timeout	403686	%s	Event Manager.lvlib Navigation.lvlib UI Manager.lvlib [GenNet-Client.lvlib] [GenNet-Server.lvlib] ActorModule.lvlib DBModule.lvlib Dummy.lvlib ExampleClone.lvlib StateMachine.lvlib
DB_CONNECTOR.lvlib: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.	[hse-db.lvlib]

Name	Code	Description	Owned by
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.	[GenNet-Client.lvlib] [GenNet-Server.lvlib] ExampleClone.lvlib

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. Boy
- DQMH® by Delacor

Furthermore, it relies on the following tools and libraries:

- Ruby
- Asciidoctor
- Java
- GraphViz