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2017-12-08	4.3.1	AUTOSAR Release Management	• Clarified signature of callbacks • Clarification in Error handling • Removed some DET errors from DET itself
2016-11-30	4.3.0	AUTOSAR Release Management	• Improved Sequence Diagrams • Added Description of Callouts (8.1.5) • Changed Port Defined Arguments in Service • Improved traceability • Added DetModuleInstance parameter • Made TransientFaults an BSW-Service
2015-07-31	4.2.2	AUTOSAR Release Management	• Harmonized Traceability • NEnsured consistent usage of development errors in all modules
2014-03-31	4.2.1	AUTOSAR Release Management	• Extended and renamed DevelopmentErrorTracer to DefaultErrorTracer by adding routines • New Routines Det_ReportRountineError and Det_ReportTransientFault • New configuration paramaters Det_ReportRountineErrorCallout and Det_ReportTransientFaultCallout
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2013-10-31	4.1.2	AUTOSAR Release Management	• Structural but non-functional improvements in document structure and creation • Editorial changes • Removed chapter(s) on change documentation
2013-03-15	4.1.1	AUTOSAR Administration	• Harmonized requirements according to SWS_General • Formalized service descriptions
2011-12-22	4.0.3	AUTOSAR Administration	• Clarifications related to include structure etc.

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2010-09-30	3.1.5	AUTOSAR Administration	• DLT is now an optional interface of DET • Harmonized parameter error handling • Removed known limitation of Revision 4.0.1
2010-02-02	3.1.4	AUTOSAR Administration	• Changed Tracing to requirements now located in SRS_Debugging • Added a Std_ReturnType value to Det_ReportError • Harmonized configuration classes • Adopted to the changed general requirements • Legal disclaimer revised • Chapter 10.3 revised
2008-08-13	3.1.1	AUTOSAR Administration	• Legal disclaimer revised
2008-02-01	3.0.2	AUTOSAR Administration	• Added API GetVersionInfo to harmonize SWS with AUTOSAR conventions • Document meta information extended • Small layout adaptations made
2007-12-21	3.0.1	AUTOSAR Administration	• Added SRS_BSW_00436 to traceability matrix • Added Memmap.h • Added Chapter 11 • Legal disclaimer revised • "Advice for users" revised • "Revision Information" added
2006-05-16	2.0	AUTOSAR Release Administration	• Changed to new SWS template
2005-05-31	1.0	AUTOSAR Administration	• Initial Release

Disclaimer

Contents

1 Introduction and functional overview

This specification describes the API of the Default Error Tracer. All detected development and runtime errors in the Basic Software are reported to this module. The API parameters allow for tracing source and kind of error:

- Module in which error has been detected
- Function in which error has been detected
- Type of error

The functionality behind the API of this module is not in scope of this specification. It is up to the software developer and software integrator to choose the optimal strategy for his specific application and testing environment. Possible functionalities could be:

- Set debugger breakpoint within error reporting API
- Count reported errors
- Handle the runtime errors by using default values
- Log calls and passed parameters in RAM buffer
- Send reported errors via communication interface to external logger

Note: The software requirements of the Default Error Tracer are specified in the SRS Diagnostics document.

2 Acronyms and Abbreviations

The glossary below includes acronyms and abbreviations relevant to the Default Error Tracer module that are not included in the [1, AUTOSAR glossary].

DET: Default Error Tracer.

3 Related documentation

3.1 Input documents & related standards and norms

[1] Glossary
AUTOSAR_FO_TR_Glossary

[2] General Specification of Basic Software Modules
AUTOSAR_CP_SWS_BSWGeneral

[3] Requirements on Diagnostics
AUTOSAR_FO_RS_Diagnostics

[4] General Requirements on Basic Software Modules
AUTOSAR_CP_SRS_BSWGeneral

3.2 Related specification

AUTOSAR provides a General Specification on Basic Software modules [2, SWS BSW General], which is also valid for Default Error Tracer.

Thus, the specification SWS BSW General shall be considered as additional and required specification for Default Error Tracer.

4 Constraints and assumptions

4.1 Limitations

This specification does not define the functionality behind the error reporting API.

Memory protection mechanisms of the operating system are not taken into account.

4.2 Applicability to car domains

No restrictions.

5 Dependencies to other modules

5.1 File structure

[SWS_Det_00037] ⌈Det.h includes all user relevant information for the tracing of errors reported via its services.⌋ *(SRS_BSW_00346)*

6 Requirements Tracing

The following tables reference the requirements specified in [3] and [4] and links to the fulfillment of these. Please note that if column “Satisfied by” is empty for a specific requirement this means that this requirement is not fulfilled by this document.

Requirement	Description	Satisfied by
[RS_Diag_04085]	No description	[SWS_Det_00009]
[RS_Diag_04086]	No description	[SWS_Det_00009] [SWS_Det_01001] [SWS_Det_01003]
[RS_Diag_04087]	No description	[SWS_Det_00202] [SWS_Det_00205]
[RS_Diag_04143]	No description	[SWS_Det_01001]
[RS_Diag_04144]	No description	[SWS_Det_01003]
[SRS_BSW_00101]	The Basic Software Module shall be able to initialize variables and hardware in a separate initialization function	[SWS_Det_00019] [SWS_Det_00020]
[SRS_BSW_00159]	All modules of the AUTOSAR Basic Software shall support a tool based configuration	[SWS_Det_00018]
[SRS_BSW_00167]	All AUTOSAR Basic Software Modules shall provide configuration rules and constraints to enable plausibility checks	[SWS_Det_00035]
[SRS_BSW_00171]	Optional functionality of a Basic-SW component that is not required in the ECU shall be configurable at pre-compile-time	[SWS_Det_00015] [SWS_Det_91002]
[SRS_BSW_00310]	API naming convention	[SWS_Det_00008] [SWS_Det_00009] [SWS_Det_00010] [SWS_Det_00011] [SWS_Det_01001] [SWS_Det_01003]
[SRS_BSW_00312]	Shared code shall be reentrant	[SWS_Det_00039]
[SRS_BSW_00318]	Each AUTOSAR Basic Software Module file shall provide version numbers in the header file	[SWS_Det_00011]
[SRS_BSW_00337]	Classification of development errors	[SWS_Det_00026] [SWS_Det_00301]
[SRS_BSW_00345]	BSW Modules shall support pre-compile configuration	[SWS_Det_00014]
[SRS_BSW_00346]	All AUTOSAR Basic Software Modules shall provide at least a basic set of module files	[SWS_Det_00037]
[SRS_BSW_00350]	All AUTOSAR Basic Software Modules shall allow the enabling/ disabling of detection and reporting of development errors.	[SWS_Det_00025]
[SRS_BSW_00358]	The return type of init() functions implemented by AUTOSAR Basic Software Modules shall be void	[SWS_Det_00008]
[SRS_BSW_00392]	Parameters shall have a type	[SWS_Det_00035]
[SRS_BSW_00394]	The Basic Software Module specifications shall specify the scope of the configuration parameters	[SWS_Det_00035] [SWS_Det_00180]

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Requirement	Description	Satisfied by
[SRS_BSW_00403]	The Basic Software Module specifications shall specify for each parameter/container whether it supports different values or multiplicity in different configuration sets	[SWS_Det_00018]
[SRS_BSW_00406]	A static status variable denoting if a BSW module is initialized shall be initialized with value 0 before any APIs of the BSW module is called	[SWS_Det_00024] [SWS_Det_00208]
[SRS_BSW_00414]	Init functions shall have a pointer to a configuration structure as single parameter	[SWS_Det_00008] [SWS_Det_00210]
[SRS_BSW_00447]	Standardizing Include file structure of BSW Modules Implementing Autosar Service	[SWS_Det_91001]
[SRS_BSW_00463]	Naming convention of callout prototypes	[SWS_Det_00180] [SWS_Det_00181] [SWS_Det_00184] [SWS_Det_00187]
[SRS_BSW_00480]	Null pointer errors shall follow a naming rule	[SWS_Det_00052]

Table 6.1: RequirementsTracing

7 Functional specification

The Default Error Tracer provides functionality to support error detection and tracing of errors during the development and runtime of Software Components and other Basic Software Modules. For this purpose the Default Error Tracer receives and evaluates error messages from these components and modules.

Due to the always specific (non generic!) requirements regarding functionality in error cases there is no explicit specification of the DET implementation, except:

- Configurable lists of error hooks will be executed in case of an error report.
- Interfaces will be provided to report errors, allow optional error recovery after reset, to handle optional error recovery information and to retrieve version information.

7.1 Initialization

[SWS_Det_00019] ⌈The DET shall provide the initialization function Det_Init (see SWS_Det_00008).⌋*(SRS_BSW_00101)*

[SWS_Det_00020] ⌈Each call of the Det_Init function shall be used to set the Default Error Tracer to a defined initial status (e.g. by removing optional error recovery information).⌋*(SRS_BSW_00101)*

Note: SWS_Det_00020 is not testable without knowledge about the non specified functionality and the probably used optional error recovery information.

Note: The usage and meaning of error recovery information is optional and not specified.

[SWS_Det_00025] ⌈The Default Error Tracer shall provide the function Det_Start (see SWS_Det_00010).⌋*(SRS_BSW_00350)*

Note: The Default Error Tracer's environment can use the function Det_Start to trigger the Default Error Tracer module for instance (if needed) in case of completed NVRAM initialization for persistent error storage.

Note: In case the Default Error Tracer does not require a startup call the Det_Start function can be empty.

Note: The integrator can decide by configuration of the EcuM, when Det_Init will be called.

Note: The integrator can decide by configuration of the EcuM or ModeM, when and whether Det_Start will be called.

7.2 Error Hooks

[SWS_Det_00207] ⌈To support debugging and error tracing during development and runtime, the Default Error Tracer provides functionality for notification of received error reports. Therefore so called error hooks are configurable. The error hooks will be used to forward error notifications. If at least one error hook has been configured, the Default Error Tracer will notify each received error report by calling the configured error hook(s).⌋*()*

Configuration of error hooks is done by the AUTOSAR configuration methods described in chapter 10.

[SWS_Det_00035] ⌈Each Error_Hook shall be called with the same set of parameters as the corresponding functions Det_ReportError, Det_ReportTransientFault and Det_ReportRuntimeError. The configured callout functions are ECU configurations, see ECUC_DET_00005, ECUC_DET_00010 and ECUC_DET_00011⌋*(SRS_BSW_00167, SRS_BSW_00392, SRS_BSW_00394)*

7.3 Error Reporting

[SWS_Det_00024] ⌈If the Default Error Tracer has not been initialized before Det_ReportTransientFault or Det_ReportRuntimeError reporting functions are called, these functions shall return immediately without any other action (no Error_Hook shall be used, no implementer specific function shall be performed and no error shall be reported).⌋*(SRS_BSW_00406)*

[SWS_Det_00208] ⌈If the Default Error Tracer has not been initialized before Det_ReportError is called, the execution shall stop. (no Error_Hook shall be used, no implementer specific function shall be performed and no error shall be reported).⌋*(SRS_BSW_00406)*

[SWS_Det_00014] ⌈The error report functions Det_ReportError, Det_ReportTransientFault and Det_ReportRuntimeError shall call immediately all configured Error_Hooks (see ECUC_Det_00010, ECUC_Det_00011).⌋*(SRS_BSW_00345)*

[SWS_Det_00018] ⌈The Default Error Tracer shall execute the corresponding list of configured DetErrorHook (refer to ECUC_Det_00005) in the order given by the configuration.⌋*(SRS_BSW_00403, SRS_BSW_00159)*

[SWS_Det_00015] ⌈Optional implementation specific functionality shall only be performed after all configured Error_Hooks (see ECUC_Det_00010 and ECUC_Det_0011) have been called. Furthermore this functionality shall be pre-compile-time configurable⌋*(SRS_BSW_00171)*

[SWS_Det_00034] ⌈Each call of the Det_ReportError, Det_ReportTransientFault and Det_ReportRuntimeError function shall be forwarded to the DLT module, if this is available/configured.⌋*()*

[SWS_Det_00039] ⌈The Det_ReportError, Det_ReportTransientFault and Det_Report RuntimeError functions shall be reentrant.⌋ *(SRS_BSW_00312)*

[SWS_Det_00026] ⌈Det_ReportError shall stop execution. Ensure that DET runtime errors and DET transient faults are handled such that DET is not called recursively.⌋ *(SRS_BSW_00337)*

Note: Such recursive call could happen in case of calling an un-initialized module via an Error_Hook and would lead to a stack overflow.

7.4 Version Information

No deviations from specified handling in [2].

7.5 Error Classification

The Default Error Tracer has the following AUTOSAR errors:

- Development errors, see Section 7.5.1
- Runtime errors: not applicable
- Transient faults: not applicable
- Production errors: not applicable
- Extended production errors: not applicable

The call of default error functions will cause calls to all configured callout functions see parameter DetErrorHook, DetReportTransientFault and DetReportRuntimeError.

[SWS_Det_00501] ⌈The calls of Det_ReportError shall invoke all callback functions configured in DetErrorHook (see parameter DetErrorHook, ECUC_Det_00005).(SRS_BSW_00345)⌋ *()*

[SWS_Det_00502] ⌈The calls of Det_ReportTransientFault shall invoke all callback functions configured in DetReportTransientFaultCallout (ECUC_Det_00011). (SRS_BSW_00345)⌋ *()*

[SWS_Det_00503] ⌈The calls of Det_ReportRuntimeError shall invoke all callback functions configured in DetReportRuntimeErrorCallout (ECUC_Det_00010). (SRS_BSW_00345)

Note: In case no Error_Hooks are configured no additional functions are called. However the forwarding to DLT is still active if configured.⌋ *()*

[SWS_Det_00052] ⌈The DET shall notify the error DET_E_PARAM_POINTER to all functions configured in callouts in case a null pointer error occurs in Det_GetVersion Info.⌋ *(SRS_BSW_00480)*

7.5.1 Development Errors

DET cannot report development errors except the DET_E_PARAM_POINTER in Det_GetVersionInfo:

[SWS_Det_00301] Definiton of development errors in module Det ⌈

Type of error	*Related error code*	*Error value*
Det_GetVersionInfo called with null parameter pointer	DET_E_PARAM_POINTER	0x01

⌋*(SRS_BSW_00337)*

7.5.2 Runtime Errors

DET cannot report runtime errors.

7.5.3 Transient Faults

DET cannot report transient faults.

7.5.4 Production Errors

There are no production errors in DET.

7.5.5 Extended Production Errors

There are no extended production errors in DET.

8 API specification

The specification of the default error tracer API is provided here.

8.1 API

8.1.1 Imported types

This section lists all imported types used by the API. Even if the DET does not require new types, some RTE or Component types can be used within the configuration of the hook functions. Therefore the DET also has the standardized include structure (see SRS_BSW_00447) for modules with service interfaces.

[SWS_Det_91001] Definition of imported datatypes of module Det ⌈

Module	*Header File*	*Imported Type*
Std	Std_Types.h	Std_ReturnType
	Std_Types.h	Std_VersionInfoType

⌋(*SRS_BSW_00447*)

8.1.2 Type definitions

8.1.2.1 Det_ConfigType

[SWS_Det_00210] Definition of datatype Det_ConfigType ⌈

Name	Det_ConfigType	
Kind	Structure	
Elements	implementation specific	
	Type	–
	Comment	–
Description	Configuration data structure of the Det module.	
Available via	Det.h	

⌋(*SRS_BSW_00414*)

8.1.3 Function definitions

8.1.3.1 Det_Init

[SWS_Det_00008] Definition of API function Det_Init ⌈

Service Name	Det_Init	
Syntax	`void Det_Init ( const Det_ConfigType* ConfigPtr )`	
Service ID [hex]	0x00	
Sync/Async	Synchronous	
Reentrancy	Non Reentrant	
Parameters (in)	ConfigPtr	Pointer to the selected configuration set.
Parameters (inout)	None	
Parameters (out)	None	
Return value	None	
Description	Service to initialize the Default Error Tracer.	
Available via	Det.h	

⌋(*SRS_BSW_00310*, *SRS_BSW_00358*, *SRS_BSW_00414*)

8.1.3.2 Det_ReportError

[SWS_Det_00009] Definition of API function Det_ReportError ⌈

Service Name	Det_ReportError	
Syntax	`Std_ReturnType Det_ReportError ( uint16 ModuleId, uint8 InstanceId, uint8 ApiId, uint8 ErrorId )`	
Service ID [hex]	0x01	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	ModuleId	Module ID of calling module.
	InstanceId	The identifier of the index based instance of a module, starting from 0, If the module is a single instance module it shall pass 0 as the InstanceId.
	ApiId	ID of API service in which error is detected (defined in SWS of calling module)
	ErrorId	ID of detected development error (defined in SWS of calling module).
Parameters (inout)	None	
Parameters (out)	None	
Return value	Std_ReturnType	never returns a value, but has a return type for compatibility with services and hooks
Description	Service to report development errors.	
Available via	Det.h	

⌋(*SRS_BSW_00310*, *RS_Diag_04086*, *RS_Diag_04085*) Note: Det_ReportError may be callable in interrupt context. Since the DET can be called in normal mode or in interrupt context (from stack or integration) this has to be considered during implementation of the hook functions: Det_ReportError can be called in interrupt context; this should be considered when halting the system.

8.1.3.3 Det_Start

[SWS_Det_00010] Definition of API function Det_Start ⌈

Service Name	Det_Start
Syntax	`void Det_Start ( void )`
Service ID [hex]	0x02
Sync/Async	Synchronous
Reentrancy	Non Reentrant
Parameters (in)	None
Parameters (inout)	None
Parameters (out)	None
Return value	None
Description	Service to start the Default Error Tracer.
Available via	Det.h

⌋(*SRS_BSW_00310*)

8.1.3.4 Det_ReportRuntimeError

[SWS_Det_01001] Definition of API function Det_ReportRuntimeError ⌈

Service Name	Det_ReportRuntimeError	
Syntax	`Std_ReturnType Det_ReportRuntimeError ( uint16 ModuleId, uint8 InstanceId, uint8 ApiId, uint8 ErrorId )`	
Service ID [hex]	0x04	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	ModuleId	Module ID of calling module.
	InstanceId	The identifier of the index based instance of a module, starting from 0, If the module is a single instance module it shall pass 0 as the InstanceId.
	ApiId	ID of API service in which error is detected (defined in SWS of calling module)
	ErrorId	ID of detected runtime error (defined in SWS of calling module).

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Parameters (inout)	None	
Parameters (out)	None	
Return value	Std_ReturnType	returns always `E_OK` (is required for services)
Description	Service to report runtime errors. If a callout has been configured then this callout shall be called.	
Available via	Det.h	

⌋(*SRS_BSW_00310*, *RS_Diag_04086*, *RS_Diag_04143*) Note: Det_ReportRuntime Error may be callable in interrupt context. Since the DET can be called in normal mode or in interrupt context (from stack or integration) this has to be considered during implementation of the hook functions: Det_ReportRuntimeError can be called in interrupt context; this hook should be reentrant and sufficiently performant.

8.1.3.5 Det_ReportTransientFault

[SWS_Det_01003] Definition of API function Det_ReportTransientFault ⌈

Service Name	Det_ReportTransientFault	
Syntax	`Std_ReturnType Det_ReportTransientFault ( uint16 ModuleId, uint8 InstanceId, uint8 ApiId, uint8 FaultId )`	
Service ID [hex]	0x05	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	ModuleId	Module ID of calling module.
	InstanceId	The identifier of the index based instance of a module, starting from 0, If the module is a single instance module it shall pass 0 as the InstanceId.
	ApiId	ID of API service in which transient fault is detected (defined in SWS of calling module)
	FaultId	ID of detected transient fault (defined in SWS of calling module).
Parameters (inout)	None	
Parameters (out)	None	
Return value	Std_ReturnType	If no callout exists it shall return `E_OK`, otherwise it shall return the value of the configured callout. In case several callouts are configured the logical or (sum) of the callout return values shall be returned. Rationale: since `E_OK`=0, `E_OK` will be only returned if all are `E_OK`, and for multiple error codes there is a good chance to detect several of them.
Description	Service to report transient faults. If a callout has been configured than this callout shall be called and the returned value of the callout shall be returned. Otherwise it returns immediately with E_OK.	
Available via	Det.h	

⌋(*SRS_BSW_00310*, *RS_Diag_04086*, *RS_Diag_04144*) Note: Det_ReportTransient Fault may be callable in interrupt context. Since the DET can be called in normal mode or in interrupt context (from stack or integration) this has to be considered during imple-

mentation of the hook functions: Det_ReportTransientFault can be called in interrupt context; this hook should be reentrant and sufficiently performant.

8.1.3.6 Det_GetVersionInfo

[SWS_Det_00011] Definition of API function Det_GetVersionInfo ⌈

Service Name	Det_GetVersionInfo	
Syntax	`void Det_GetVersionInfo ( Std_VersionInfoType* versioninfo )`	
Service ID [hex]	0x03	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	None	
Parameters (inout)	None	
Parameters (out)	versioninfo	Pointer to where to store the version information of this module.
Return value	None	
Description	Returns the version information of this module.	
Available via	Det.h	

⌋*(SRS_BSW_00310, SRS_BSW_00318)* In case a null pointer is passed, DET_E_PARAM_POINTER is returned, see SWS_Det_00052.

8.1.4 Expected Interfaces

This chapter specifies all required interfaces of other modules.

8.1.4.1 Mandatory Interfaces

There is no mandatory expected interface, but all <User_ErrorHooks> APIs that are used and are configured as callouts have to be included.

Note: The name of the user API will not be specified, <User_ErrorHook> is a synonym only.

Note: A list of User_ErrorHook can be defined.

8.1.4.2 Optional Interfaces

This chapter defines the interfaces that are required to fulfill an optional functionality of the Default Error Tracer.

[SWS_Det_91002] Definition of optional interfaces in module Det ⌈

API Function	*Header File*	*Description*
Dlt_DetForwardErrorTrace	Dlt_Det.h	Service to forward error reports from Det to Dlt.

⌋(*SRS_BSW_00171*)

8.1.5 Callout Functions / Configurable Interfaces

[SWS_Det_00180] ⌈if callout functions are configured, they should have the same signatures as the corresponding functions. If several callouts are defined for the same service they should have the same ID.⌋(*SRS_BSW_00463, SRS_BSW_00394*)

If Det_ReportError function is called, all configured callout functions shall be called (see SWS_Det_00501). User_ErrorHooks functions should have the Service ID 0x10.

[SWS_Det_00181] Definition of configurable interface <User_Error_Hooks> ⌈

Service Name	<User_Error_Hooks>	
Syntax	`Std_ReturnType <User_Error_Hooks> ( uint16 ModuleId, uint8 InstanceId, uint8 ApiId, uint8 ErrorId )`	
Service ID [hex]	0x10	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	ModuleId	Module ID of calling module.
	InstanceId	The identifier of the index based instance of a module, starting from 0, If the module is a single instance module it shall pass 0 as the InstanceId.
	ApiId	ID of API service in which error is detected (defined in SWS of calling module)
	ErrorId	ID of detected development error (defined in SWS of calling module).
Parameters (inout)	None	
Parameters (out)	None	
Return value	Std_ReturnType	returns always `E_OK` (is required for services)
Description	–	
Available via	Det_Externals.h	

⌋(*SRS_BSW_00463*) If Det_ReportRuntimeError function is called, all configured callout functions shall be called (see SWS_Det_00503). DetReportRuntimeErrorCallout functions should have the Service ID 0x11.

[SWS_Det_00184] Definition of configurable interface <DetReportRuntimeError Callout> ⌈

Service Name	<DetReportRuntimeErrorCallout>	
Syntax	`Std_ReturnType <DetReportRuntimeErrorCallout> ( uint16 ModuleId, uint8 InstanceId, uint8 ApiId, uint8 ErrorId )`	
Service ID [hex]	0x11	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	ModuleId	Module ID of calling module.
	InstanceId	The identifier of the index based instance of a module, starting from 0, If the module is a single instance module it shall pass 0 as the InstanceId.
	ApiId	ID of API service in which error is detected (defined in SWS of calling module)
	ErrorId	ID of detected runtime error (defined in SWS of calling module).
Parameters (inout)	None	
Parameters (out)	None	
Return value	Std_ReturnType	returns always `E_OK` (is required for services)
Description	–	
Available via	Det_Externals.h	

⌋*(SRS_BSW_00463)*

If Det_ReportTransientFault function is called, all configured callout functions are called (see SWS_Det_00502).

[SWS_Det_00187] Definition of configurable interface <DetReportTransientFault Callout> ⌈

Service Name	<DetReportTransientFaultCallout>	
Syntax	`Std_ReturnType <DetReportTransientFaultCallout> ( uint16 ModuleId, uint8 InstanceId, uint8 ApiId, uint8 FaultId )`	
Service ID [hex]	0x12	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	ModuleId	Module ID of calling module.
	InstanceId	The identifier of the index based instance of a module, starting from 0, If the module is a single instance module it shall pass 0 as the InstanceId.
	ApiId	ID of API service in which transient fault is detected (defined in SWS of calling module)
	FaultId	ID of detected transient fault (defined in SWS of calling module).
Parameters (inout)	None	

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Parameters (out)	None	
Return value	Std_ReturnType	Value is propagated to caller of Det_ReportTransientFault.
Description	–	
Available via	Det_Externals.h	

⌋(*SRS_BSW_00463*)

8.2 Service Interfaces

8.2.1 Specification of the Ports and Port Interfaces

This chapter specifies the ports and port interfaces which are needed in order to operate the Default Error Tracer functionality over the VFB.

Each AUTOSAR SW-C which uses the service must contain "service ports" in its own SW-C description which will be typed by the same interfaces and which has to be connected to the ports of the Default Error Tracer, so that the RTE, the appropriate IDs and the required symbols can be generated.

8.2.1.1 General Approach

The client-server paradigm is used since more than one parameter has to be transferred.

In order to reuse the C API already defined in the Default Error Tracer BSW module, the Default Error Tracer services uses the same argument names as in the C API, even though the names can not directly be mapped into the SW-C world. "Module ID" can preferably be interpreted as either a component or runnable entity but this is the decision of the implementer of the SW-C.

The Default Error Tracer services need a "Module ID" as first argument for the C-function.

In order to keep the client code independent from the configuration of number of clients, the "Module IDs" are not passed from the clients to Default Error Tracer but are modeled as "port defined argument values" of the Provide ports on the Default Error Tracer side. As a consequence, the "Module IDs" will not show up as arguments in the operation of the client-server interface. As a further consequence for this approach, there will be separate ports for each "Module ID" both on the client side as well as on the server side.

The Module ID type is of range 0...65535. Values in the range of 0...254 are reserved for Basic Software Modules, complex drivers use either 255 or a value between 2048 and 4095. All others can be used for application software components.

8.2.1.2 Data Types

[SWS_Det_00200] ⌈For the port interface of the Default Error Tracer service uint8 and uint16 are required and refer to the AUTOSAR data types.⌋ *()*

8.2.1.3 Port Interface

[SWS_Det_00202] Definition of ClientServerInterface DETService ⌈

Name	DETService		
Comment	Service of Default Error Tracer		
IsService	true		
Variation	–		
Possible Errors	0	E_OK	Operation successful

Operation	ReportError	
Comment	calls Det_ReportError with the Module ID of the port	
Mapped to API	Det_ReportError	
Variation	–	
Parameters	ApiId	
	Type	uint8
	Direction	IN
	Comment	ID of API service in which error is detected (defined in SWS of calling module).
	Variation	–
	ErrorId	
	Type	uint8
	Direction	IN
	Comment	ID of detected development error (defined in SWS of calling module).
	Variation	–
Possible Errors	E_OK	

Operation	ReportRuntimeError	
Comment	calls ReportRuntimeError with the Module ID of the port	
Mapped to API	Det_ReportRuntimeError	
Variation	–	
Parameters	ApiId	
	Type	uint8
	Direction	IN
	Comment	ID of API service in which error is detected (defined in SWS of calling module).
	Variation	–
	ErrorId	
	Type	uint8
	Direction	IN
	Comment	ID of detected runtime error (defined in SWS of calling module).
	Variation	–
Possible Errors	E_OK	

⌋ *(RS_Diag_04087)*

[SWS_Det_00203] ⌈The arguments of the C-Api ModuleId and InstanceId are used to identify the component and component instance by using "port defined argument values". The arguments ApiId and ErrorId are not standardized by AUTOSAR for software components. It is up to the implementer of a SW-C to decide about the semantics of the arguments. However, the ApiId typically corresponds to the operations that can report an error, and ErrorId corresponds to the type of error that is reported. Both Api Id and ErrorId are numbered 0x00..0xFF without specific order. Note that the returned values is always true (E_OK), since a Std_ReturnType is required for all services⌋*()*

8.2.2 Definition of the Service

[SWS_Det_00204] ⌈The Provide Ports have a certain relation to the internal behavior of the DET: With each call, the "Module ID" is passed as an additional argument by the RTE to the C-function which implements the associated runnable entity (feature "port defined argument value").⌋*()*

The DET shall provide the following Port for each configured SWC module with the given name.

[SWS_Det_00205] Definition of Port Det_{Name} provided by module Det ⌈

Name	Det_{Name}		
Kind	ProvidedPort	***Interface***	DETService
Description	–		
Port Defined Argument Value(s)	***Type***	uint16	
	Value	{ecuc(Det/DetConfigSet/DetModule/DetModuleId.value)}	
	Type	uint8	
	Value	{ecuc(Det/DetConfigSet/DetModule/DetModuleInstance/DetInstanceId.value)}	
Variation	Name = {ecuc(Det/DetConfigSet/DetModule.SHORT-NAME)}_{ecuc(Det/DetConfigSet/DetModule/DetModuleInstance.SHORT-NAME)}		

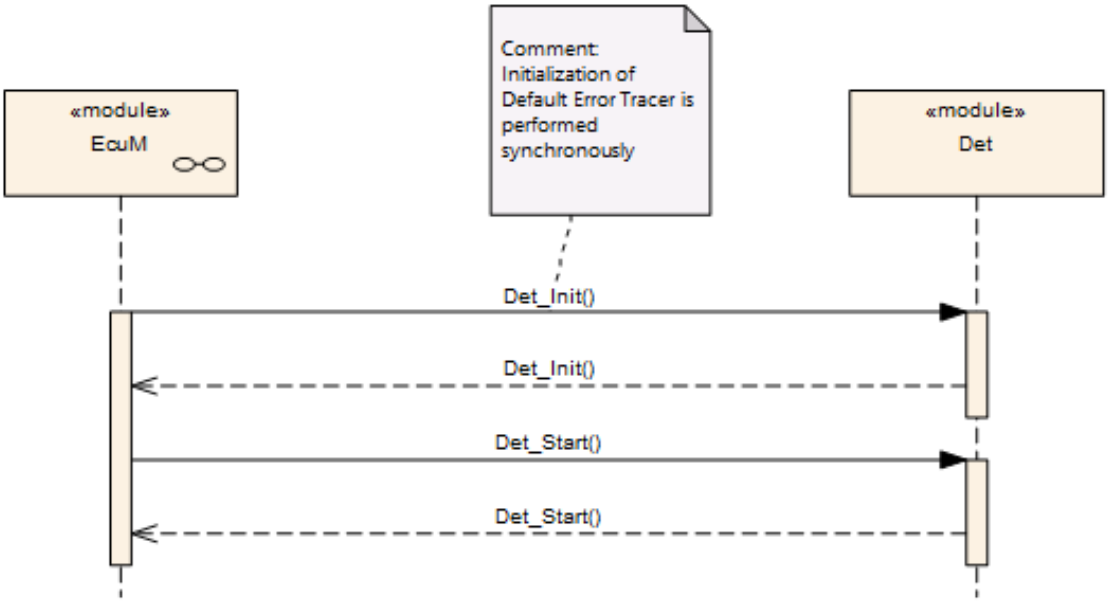
⌋*(RS_Diag_04087)*

8.2.3 Configuration of the DET

[SWS_Det_00206] ⌈The "Module IDs" of the DET service are modeled as "port defined argument values". Thus the configuration of those values is part of the RTE configuration. Pre-compile configuration can be done by changing the XML specification for the ports on the client (SW-C) or service (i.e. DET) side.⌋*()*

9 Sequence diagrams

9.1 Initialization



9.2 Error Reporting

There are different scenarios: one for each error class (DevelopmentError, Runtime Error and TransientFault) and one for each configuration: no hooks configured, at least one hook configured.

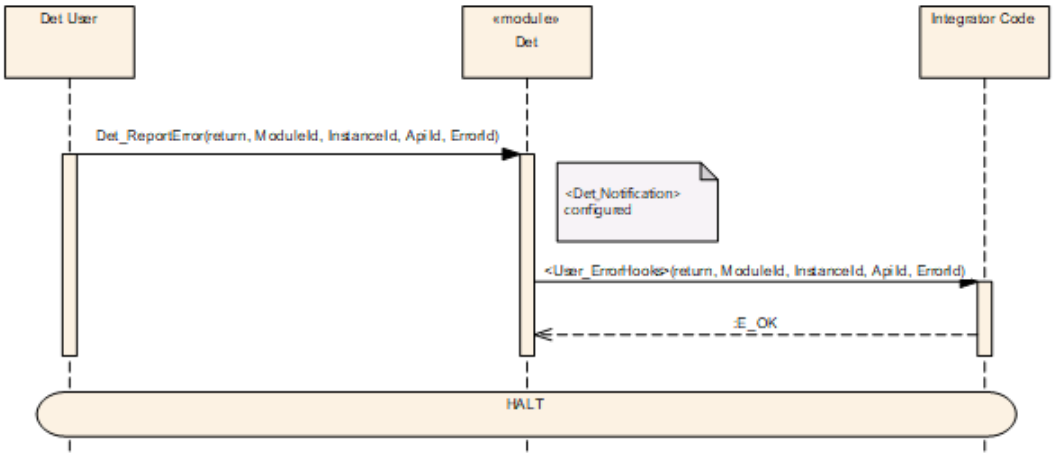


Figure 9.2: Det:_ReportError with configured hook

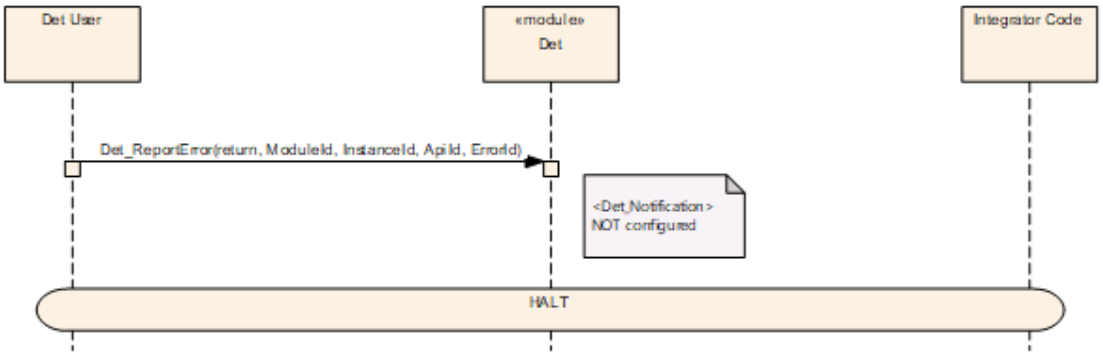


Figure 9.3: Det:_ReportError without configured hook

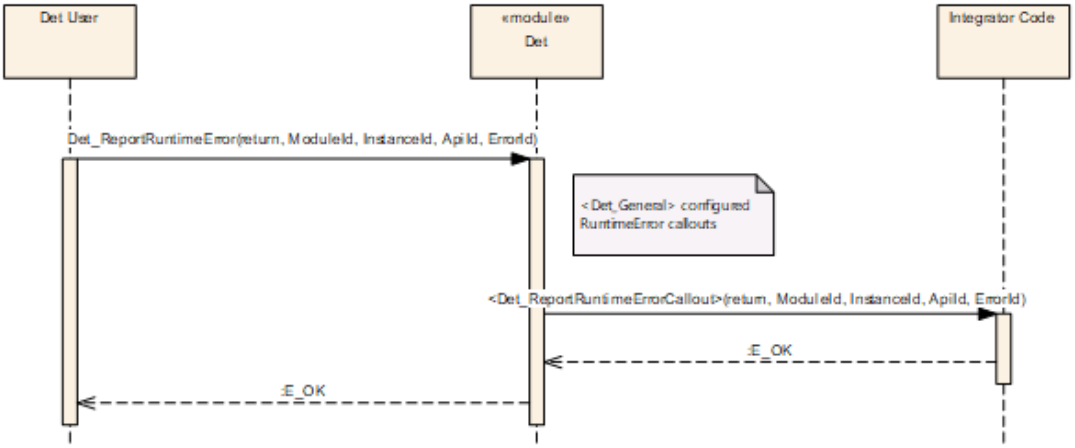


Figure 9.4: Det:_ ReportRuntimeError with configured hook

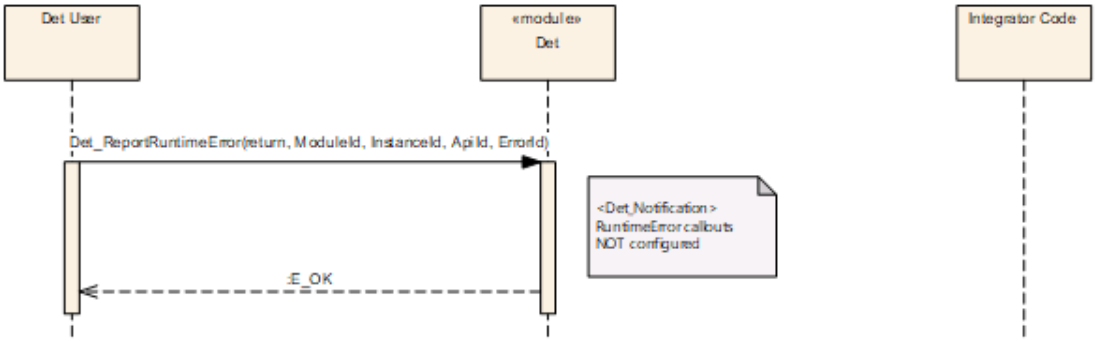


Figure 9.5: Det:_ ReportRuntimeError without configured hook

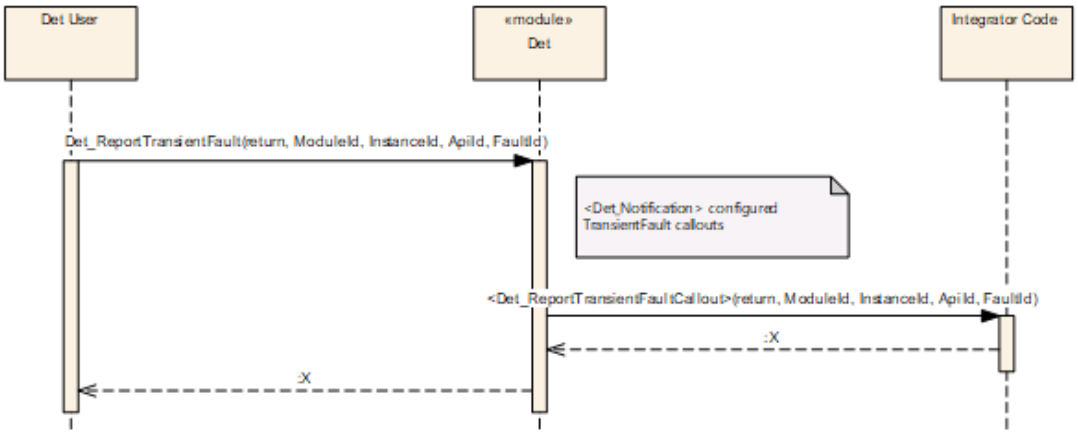


Figure 9.6: Det:_ ReportTransientFault with configured hook

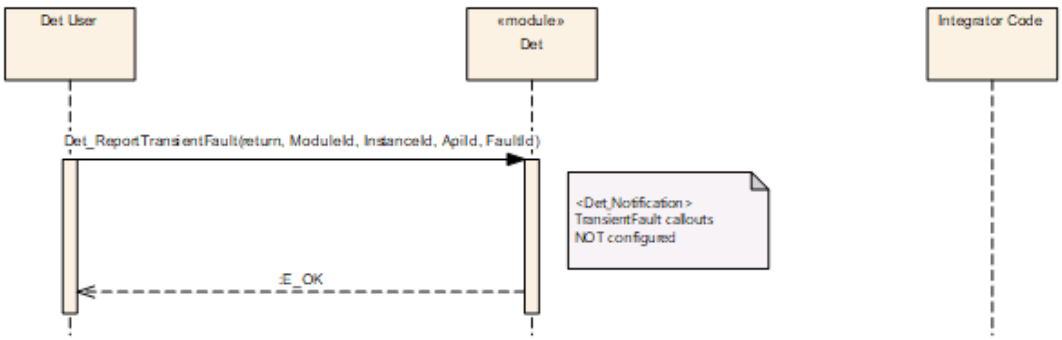


Figure 9.7: Det:_ ReportTransientFault without configured hook

10 Configuration specification

In general, this chapter defines configuration parameters and their clustering into containers. In order to support the specification Chapter 10.1 describes fundamentals. It also specifies a template (table) you shall use for the parameter specification. We intend to leave Chapter 10.1 in the specification to guarantee comprehension.

Chapter 10.2 specifies the structure (containers) and the parameters of the module Default Error Tracer.

Chapter 10.4 specifies published information of the module Default Error Tracer.

10.1 How to read this chapter

For details refer to the chapter 10.1 “Introduction to configuration specification” in SWS_BSWGeneral.

10.2 Containers and configuration parameters

The Parameters of DET are described in the following sub-sections.

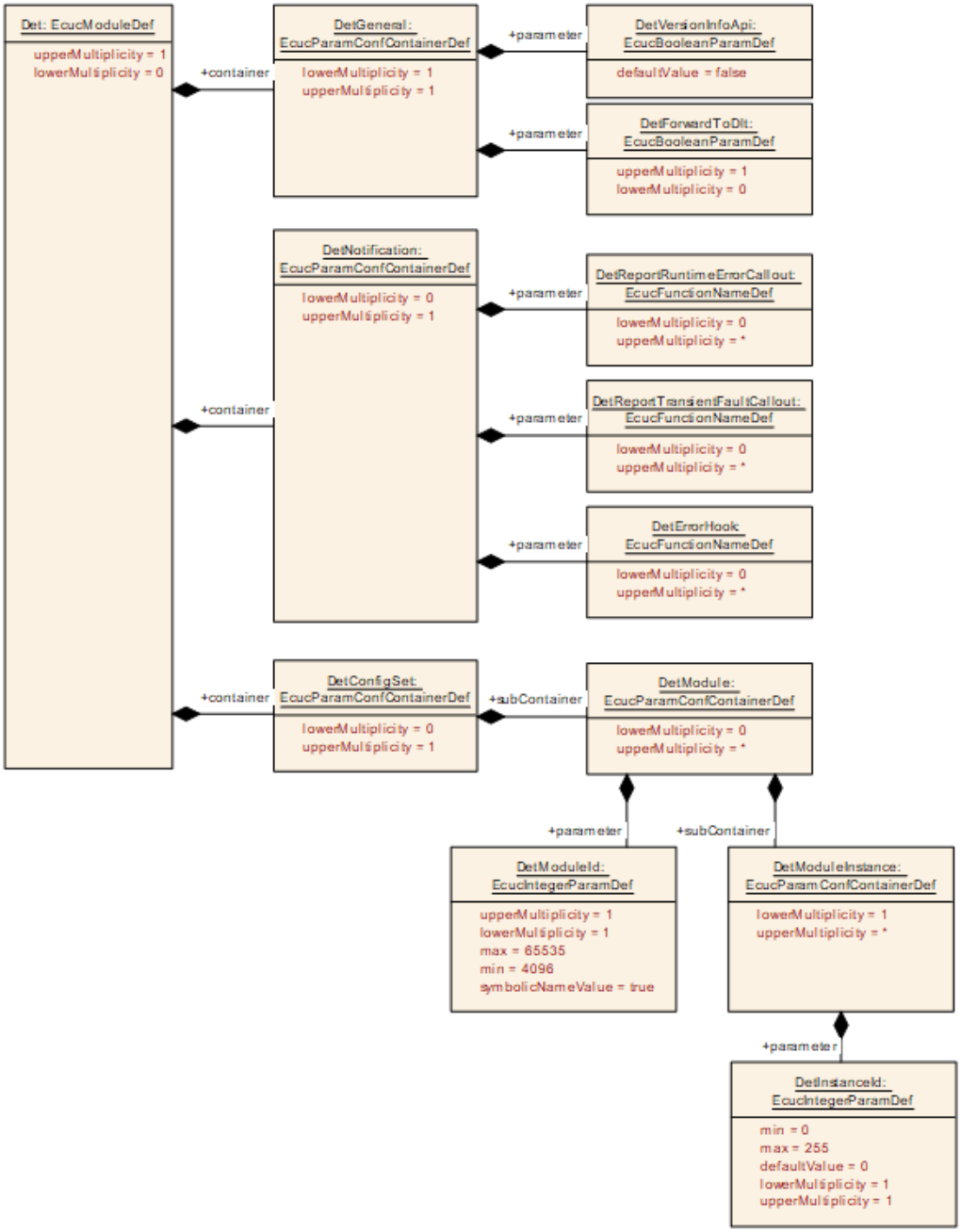


Figure 10.1: Parameters of DET

Figure 10.1 gives an overview over them.

10.2.1 Det

SWS Item	[ECUC_Det_00001]
Module Name	Det
Description	Det configuration includes the functions to be called at notification. On one side the application functions are specified and in general it can be decided whether Dlt shall be called at each call of Det.
Post-Build Variant Support	false
Supported Config Variants	VARIANT-PRE-COMPILE

Included Containers		
Container Name	Multiplicity	Scope / Dependency
DetConfigSet	0..1	Configuration set container for Det.
DetGeneral	1	Generic configuration parameters of the Det module.
DetNotification	0..1	Configuration of the notification functions.

10.2.2 DetGeneral

SWS Item	[ECUC_Det_00002]
Container Name	DetGeneral
Parent Container	Det
Description	Generic configuration parameters of the Det module.
Configuration Parameters	

SWS Item	[ECUC_Det_00006]		
Parameter Name	DetForwardToDlt		
Parent Container	DetGeneral		
Description	Only if the parameter is present and set to true, the Det requires the Dlt interface and forwards it's call to the function Dlt_DetForwardErrorTrace. In this case the optional interface to Dlt_Det is required.		
Multiplicity	0..1		
Type	EcucBooleanParamDef		
Default value	–		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	Pre-compile time	X	All Variants
	Link time	–	
	Post-build time	–	
Value Configuration Class	Pre-compile time	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

SWS Item	[ECUC_Det_00003]		
Parameter Name	DetVersionInfoApi		
Parent Container	DetGeneral		
Description	Pre-processor switch to enable / disable the API to read out the modules version information. true: Version info API enabled. false: Version info API disabled.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	Pre-compile time	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

No Included Containers

10.2.3 DetNotification

SWS Item	[ECUC_Det_00004]
Container Name	DetNotification
Parent Container	Det
Description	Configuration of the notification functions.
Configuration Parameters	

SWS Item	[ECUC_Det_00005]		
Parameter Name	DetErrorHook		
Parent Container	DetNotification		
Description	Optional list of functions to be called by the Default Error Tracer in context of each call of Det_ReportError. The type of these functions shall be identical the type of Det_ReportError itself: Std_ReturnType (*f)(uint16, uint8, uint8, uint8).		
Multiplicity	0..*		
Type	EcucFunctionNameDef		
Default value	–		
Regular Expression	–		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	Pre-compile time	X	All Variants
	Link time	–	
	Post-build time	–	
Value Configuration Class	Pre-compile time	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

SWS Item	[ECUC_Det_00010]		
Parameter Name	DetReportRuntimeErrorCallout		
Parent Container	DetNotification		
Description	This parameter defines the existence and the names of callout functions for the corresponding runtime error handler. The type of these functions shall be identical the type of Det_ReportRuntimeError itself: Std_ReturnType (*f)(uint16, uint8, uint8, uint8)		
Multiplicity	0..*		
Type	EcucFunctionNameDef		
Default value	–		
Regular Expression	–		
Value Configuration Class	Pre-compile time	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

SWS Item	[ECUC_Det_00011]		
Parameter Name	DetReportTransientFaultCallout		
Parent Container	DetNotification		
Description	This parameter defines the existence and the names of callout functions for the corresponding transient fault handler. The type of these functions shall be identical the type of Det_ReportTransientFault itself: Std_ReturnType (*f)(uint16, uint8, uint8, uint8)		
Multiplicity	0..*		
Type	EcucFunctionNameDef		
Default value	–		
Regular Expression	–		
Value Configuration Class	Pre-compile time	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

No Included Containers

10.2.4 DetConfigSet

SWS Item	[ECUC_Det_00007]
Container Name	DetConfigSet
Parent Container	Det
Description	Configuration set container for Det.
Configuration Parameters	

Included Containers		
Container Name	Multiplicity	Scope / Dependency
DetModule	0..*	This container describes a non BSW module that is using the Det via Service Interface.

10.2.5 DetModule

SWS Item	[ECUC_Det_00008]		
Container Name	DetModule		
Parent Container	DetConfigSet		
Description	This container describes a non BSW module that is using the Det via Service Interface.		
Configuration Parameters			

SWS Item	[ECUC_Det_00009]		
Parameter Name	DetModuleId		
Parent Container	DetModule		
Description	Unique identifier of the error reporting component. When reporting errors to the DET, a symbolic name derived from the moduleID has to be used to identify the reporter.		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	4096 .. 65535		
Default value	–		
Post-Build Variant Value	false		
Value Configuration Class	Pre-compile time	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

Included Containers		
Container Name	Multiplicity	Scope / Dependency
DetModuleInstance	1..*	Describes the Instance used for the according Service Port. It shall be used to differentiate software component instances when multiple instantiation is used.

10.2.6 DetModuleInstance

SWS Item	[ECUC_Det_00013]		
Container Name	DetModuleInstance		
Parent Container	DetModule		
Description	Describes the Instance used for the according Service Port. It shall be used to differentiate software component instances when multiple instantiation is used.		
Post-Build Variant Multiplicity	true		
Multiplicity Configuration Class	Pre-compile time	X	All Variants
	Link time	–	
	Post-build time	–	
Configuration Parameters			

SWS Item	[ECUC_Det_00012]
Parameter Name	DetInstanceId
Parent Container	DetModuleInstance

▽

△

Description	Describes the InstanceId used for the according Service Port. It shall be used to differentiate software component instances when multiple instantiation is used. Else it shall be set to 0.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	0		
Post-Build Variant Value	false		
Value Configuration Class	**Pre-compile time**	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

No Included Containers

10.3 Published Information

Additional module-specific published parameters are listed below if applicable.

10.4 Published Information

For details refer to the chapter 10.3 “Published Information” in SWS_BSWGeneral.

A Not applicable requirements

[SWS_Det_NA_00999] ⌈These requirements are not applicable to this specification.⌋*(SRS_BSW_00301, SRS_BSW_00304, SRS_BSW_00305, SRS_BSW_00306, SRS_BSW_00307, SRS_BSW_00308, SRS_BSW_00309, SRS_BSW_00439, SRS_BSW_00314, SRS_BSW_00325, SRS_BSW_00328, SRS_BSW_00330, SRS_BSW_00331, SRS_BSW_00334, SRS_BSW_00335, SRS_BSW_00341, SRS_BSW_00342, SRS_BSW_00343, SRS_BSW_00347, SRS_BSW_00441, SRS_BSW_00353, SRS_BSW_00350, SRS_BSW_00359, SRS_BSW_00360, SRS_BSW_00440, SRS_BSW_00373, SRS_BSW_00377, SRS_BSW_00378, SRS_BSW_00379, SRS_BSW_00401, SRS_BSW_00410, SRS_BSW_00413, SRS_BSW_00415, SRS_BSW_00005, SRS_BSW_00006, SRS_BSW_00007, SRS_BSW_00009, SRS_BSW_00010, SRS_BSW_00160, SRS_BSW_00161, SRS_BSW_00162, SRS_BSW_00164, SRS_BSW_00172, SRS_BSW_00344, SRS_BSW_00404, SRS_BSW_00405, SRS_BSW_00170, SRS_BSW_00380, SRS_BSW_00419, SRS_BSW_00383, SRS_BSW_00388, SRS_BSW_00389, SRS_BSW_00390, SRS_BSW_00393, SRS_BSW_00395, SRS_BSW_00396, SRS_BSW_00397, SRS_BSW_00398, SRS_BSW_00399, SRS_BSW_00400, SRS_BSW_00438, SRS_BSW_00375, SRS_BSW_00416, SRS_BSW_00406, SRS_BSW_00437, SRS_BSW_00168, SRS_BSW_00407, SRS_BSW_00423, SRS_BSW_00424, SRS_BSW_00425, SRS_BSW_00426, SRS_BSW_00427, SRS_BSW_00428, SRS_BSW_00429, SRS_BSW_00432, SRS_BSW_00433, SRS_BSW_00336, SRS_BSW_00369, SRS_BSW_00339, SRS_BSW_00348, SRS_BSW_00357, SRS_BSW_00422, SRS_BSW_00417, SRS_BSW_00323, SRS_BSW_00004, SRS_BSW_00409, SRS_BSW_00385, SRS_BSW_00386, SRS_BSW_00458, SRS_BSW_00466)*

B History of Requirements

Please note that the lists in this chapter also include requirements that have been removed from the specification in a later version. These requirements do not appear as hyperlinks in the document.

B.1 Requirement History of this Document According to AUTOSAR Release R22-11

B.1.1 Added Specification Items in R22-11

[SWS_Det_91001] [SWS_Det_91002] [SWS_Det_NA_00999]

B.1.2 Changed Specification Items in R22-11

[SWS_Det_00008] [SWS_Det_00009] [SWS_Det_00010] [SWS_Det_00011] [SWS_Det_00181] [SWS_Det_00184] [SWS_Det_00187] [SWS_Det_00202] [SWS_Det_00204] [SWS_Det_00205] [SWS_Det_00210] [SWS_Det_00301] [SWS_Det_01001] [SWS_Det_01003]

B.1.3 Deleted Specification Items in R22-11

[SWS_Det_00999]

B.2 Requirement History of this Document According to AUTOSAR Release R23-11

B.2.1 Added Specification Items in R23-11

none

B.2.2 Changed Specification Items in R23-11

none

B.2.3 Deleted Specification Items in R23-11

none