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2008-08-13	3.1.1	AUTOSAR Administration	• Legal disclaimer revised

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2007-01-24	2.1.15	AUTOSAR Administration	• "Advice for users" revised • "Revision Information" added
2006-11-28-01	2.1.1	AUTOSAR Administration	• Changed definition of Standard_ReturnType to match the RTE definition. • A complete overview of definitions and values has been performed to match the requirements in the SRS General.
2006-05-16	2.0	AUTOSAR Administration	• Initial Release

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1 Introduction and functional overview

This document specifies the AUTOSAR standard types header file. It contains all types that are used across several modules of the basic software and that are platform and compiler independent.

It is strongly recommended that those standard types files are unique within the AUTOSAR community to guarantee unique types and to avoid types changes when changing from supplier A to B.

2 Acronyms and abbreviations

All acronyms and abbreviations of this specification are contained in the AUTOSAR glossary [1, AUTOSAR glossary].

3 Related documentation

3.1 Input documents & related standards and norms

[1] Glossary
AUTOSAR_FO_TR_Glossary

[2] General Requirements on Basic Software Modules
AUTOSAR_CP_RS_BSWGeneral

[3] General Requirements on SPAL
AUTOSAR_CP_RS_SPALGeneral

[4] Specification of RTE Software
AUTOSAR_CP_SWS_RTE

[5] ISO 17356-3: Road vehicles – Open interface for embedded automotive applications – Part 3: OSEK/VDX Operating System (OS)

[6] General Specification of Basic Software Modules
AUTOSAR_CP_SWS_BSWGeneral

3.2 Related specification

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

Thus, the specification SWS BSW General shall be considered as additional and required specification for Standard Types.

Further specification:

[3, SRS SPALGeneral] [4, SWS RTE] [2, RS BSW General] [5, OSEK/VDX Operating System] [ISO/IEC 9899:1990]

4 Constraints and assumptions

4.1 Limitations

No limitations.

4.2 Applicability to car domains

Many symbols defined in this specification (like OK, NOT_OK, ON, OFF) are already defined and used within legacy software. These conflicts ('redefinition of existing symbol') are expected, but neglected, because of the following reasons:

AUTOSAR has to maintain network compatibility with legacy ECUs, but no software architecture compatibility with legacy software. Many types are defined and used exactly in the same way that legacy software does. Legacy software can keep on using the symbols, only the definitions have to be removed and taken from this file instead.

5 Software Architecture

5.1 Dependencies to other modules

There are no dependencies to other modules, but the standard types header requires the header of the platform types.

5.2 File structure

The include structures differ between BSW modules which are part of the COM-stack and other modules. BSW modules which are considered part of the COM stack shall include the ComStack_Types.h other modules shall include Std_Types.h

As the types of Std_Types.h are based on Platform_Types.h, it includes this header to be self contained.

6 Requirements Tracing

The following tables reference the requirements specified in SRS BSW General [2] 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
[SRS_BSW_00004]	All Basic SW Modules shall perform a pre-processor check of the versions of all imported include files	[SWS_Std_91003]
[SRS_BSW_00161]	The AUTOSAR Basic Software shall provide a microcontroller abstraction layer which provides a standardized interface to higher software layers	[SWS_Std_00004]
[SRS_BSW_00305]	Data types naming convention	[SWS_Std_00017] [SWS_Std_00019] [SWS_Std_91001] [SWS_Std_91002]
[SRS_BSW_00348]	All AUTOSAR standard types and constants shall be placed and organized in a standard type header file	[SWS_Std_00007] [SWS_Std_00010] [SWS_Std_00013]
[SRS_BSW_00357]	For success/failure of an API call a standard return type shall be defined	[SWS_Std_00005] [SWS_Std_00006] [SWS_Std_00011]
[SRS_BSW_00441]	Naming convention for type, macro and function	[SWS_Std_00011]
[SRS_BSW_00480]	Null pointer errors shall follow a naming rule	[SWS_Std_00031]
[SRS_Xfrm_00002]	A transformer shall provide fixed interfaces	[SWS_Std_00029]
[SRS_Xfrm_00004]	A transformer shall support error handling	[SWS_Std_00021] [SWS_Std_00022] [SWS_Std_00024] [SWS_Std_00025]
[SRS_Xfrm_00008]	A transformer shall specify its output format	[SWS_Std_00022] [SWS_Std_00023]
[SRS_Xfrm_00009]	A fixed set of transformer classes shall exist	[SWS_Std_00023]
[SRS_Xfrm_00010]	Each transformer class shall provide a fixed set of abstract errors	[SWS_Std_00024]
[SRS_Xfrm_00011]	A transformer shall belong to a specific transformer class	[SWS_Std_00026]

Table 6.1: Requirements Tracing

7 Functional specification

7.1 General issues

[SWS_Std_00004]

Upstream requirements: SRS_BSW_00161

⌈It is not allowed to add any project or supplier specific extension to this file. Any extension invalidates the AUTOSAR conformity.⌋

7.2 Error Classification

The Chapter [6, General Specification of Basic Software Modules] 7.2 *"Error Handling"* describes the error handling of the Basic Software in detail. Above all, it constitutes a classification scheme consisting of five error types which may occur in BSW modules.

Based on this foundation, the following section specifies particular errors arranged in the respective subsections below.

7.2.1 Development Errors

There are no development errors.

7.2.2 Runtime Errors

There are no runtime errors.

7.2.3 Production Errors

There are no production errors.

8 API specification

8.1 Type definitions

8.1.1 Std_ReturnType

[SWS_Std_00005] Definition of datatype Std_ReturnType

Upstream requirements: SRS_BSW_00357

⌈

Name	Std_ReturnType		
Kind	Type		
Derived from	uint8		
Range	E_OK	0	see [SWS_Std_00006]
	E_NOT_OK	1	see [SWS_Std_00006]
	0x02-0x3F	2	Available to user specific errors
Description	This type can be used as standard API return type which is shared between the RTE and the BSW modules. It shall be defined as follows: typedef uint8 Std_ReturnType;		
Available via	Std_Types.h		

⌋

[SWS_Std_00011]

Upstream requirements: SRS_BSW_00357, SRS_BSW_00441

⌈The Std_ReturnType shall normally be used with value E_OK or E_NOT_OK. If those return values are not sufficient user specific values can be defined by using the 6 least specific bits.

For the naming of the user defined values the module prefix shall be used as requested in SRS_BSW_00441

Layout of the Std_ReturnType shall be as stated in the RTE specification. Bit 7 and Bit 8 are reserved and defined by the RTE specification.

⌋

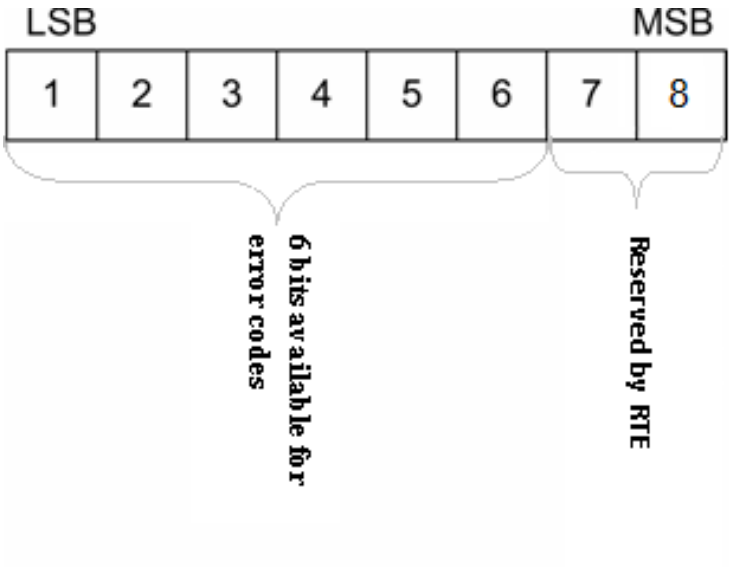


Figure 8.1: Layout of Std_Return_Type

8.1.2 Std_TransformerError

The data type Std_TransformerError is a struct which contains the error code and the transformer class to which the error belongs.

The data type Std_TransformerError shall be defined as follows:

[SWS_Std_00021] Definition of datatype Std_TransformerError

Upstream requirements: SRS_Xfrm_00004

⌈

Name	Std_TransformerError	
Kind	Structure	
Elements	errorCode	
	Type	Std_TransformerErrorCode
	Comment	The specific meaning of the values of Std_TransformerErrorCode is to be seen for the specific transformer chain for which the data type represents the transformer error.
	transformerClass	
	Type	Std_TransformerClass
	Comment	–
Description	Std_TransformerError represents a transformer error in the context of a certain transformer chain.	
Available via	Std_Types.h	

⌋

The values are specified for each transformer class in [26, ASWS Transformer General].

[SWS_Std_00022] Definition of datatype Std_TransformerErrorCode

Upstream requirements: SRS_Xfrm_00004, SRS_Xfrm_00008

⌈

Name	Std_TransformerErrorCode		
Kind	Type		
Derived from	uint8		
Range	-	–	The values are specified for each transformer class in ASWS_ TransformerGeneral.
Description	The type of the Std_TransformerError.		
Available via	Std_Types.h		

⌋

The Std_TransformerClass represents the transformer class in which the error occurred.

[SWS_Std_00023]

Upstream requirements: SRS_Xfrm_00009, SRS_Xfrm_00008

⌈The underlying data type of the type Std_TransformerClass shall be uint8.⌋

The type Std_TransformerClass shall be an enumeration with the following elements where each element represents a transformer class:

[SWS_Std_00024] Definition of datatype Std_TransformerClass

Upstream requirements: SRS_Xfrm_00004, SRS_Xfrm_00010

⌈

Name	Std_TransformerClass		
Kind	Type		
Derived from	uint8		
Range	STD_TRANSFORMER_ UNSPECIFIED	0x00	Transformer of a unspecified transformer class.
	STD_TRANSFORMER_ SERIALIZER	0x01	Transformer of a serializer class.
	STD_TRANSFORMER_ SAFETY	0x02	Transformer of a safety class.
	STD_TRANSFORMER_ SECURITY	0x03	Transformer of a security class.
	STD_TRANSFORMER_ CUSTOM	0xFF	Transformer of a custom class not standardized by AUTOSAR.
Description	Std_TransformerClass is an enumeration where each element represents a transformer class.		
Available via	Std_Types.h		

⌋

[SWS_Std_00025]

Upstream requirements: SRS_Xfrm_00004

⌈The transformer class STD_TRANSFORMER_UNSPECIFIED shall be used if no transformer error occured.⌋

[SWS_Std_00026]

Upstream requirements: SRS_Xfrm_00011

⌈The mapping from transformerClass of TransformationTechnology to value of data type Std_TransformerClass shall be:

- transformerClass serializer - STD_TRANSFORMER_SERIALIZER
- transformerClass safety - STD_TRANSFORMER_SAFETY
- transformerClass security - STD_TRANSFORMER_SECURITY
- transformerClass custom - STD_TRANSFORMER_CUSTOM

⌋

8.1.3 Std_TransformerForwardCode

The data type Std_TransformerForwardCode represents a forwarded transformer code in the context of a certain transformer chain (see [6]).

The specific meaning of the values of Std_TransformerForwardCode is always to be seen for the specific transformer chain for which the data type represents the transformer status.

The underlying data type of the type Std_TransformerForwardCode shall be uint8:

[SWS_Std_00029] Definition of datatype Std_TransformerForwardCode

Status: DRAFT

Upstream requirements: SRS_Xfrm_00002

⌈

Name	Std_TransformerForwardCode (draft)		
Kind	Type		
Derived from	uint8		
Range	STD_E_FORWARDCODE_OK	0x00	No specific error to be injected.
	STD_E_FORWARDCODE_STATUS_REP	0x01	Repeat the last used sequence number.
	STD_E_FORWARDCODE_STATUS_SEQ	0x02	Generate a deliberately wrong CRC.
	STD_E_FORWARDCODE_STATUS_ERR	0x03	Use a wrong sequence number.
Description	– **Tags:** atp.Status=draft		
Available via	Std_Types.h		

⌋

8.1.4 Std_MessageTypeType

[SWS_Std_91001] Definition of datatype Std_MessageTypeType

Upstream requirements: SRS_BSW_00305

⌈

Name	Std_MessageTypeType		
Kind	Type		
Derived from	uint8		
Range	STD_MESSAGETYPE_ REQUEST	0x00	Message type for a request message
	STD_MESSAGETYPE_ RESPONSE	0x01	Message type for a response message
	0x02-0x3F	0x02	reserverd for future message type
Description	This type is used to encode the different type of messages. - Currently this encoding is limited to the distinction between requests and responses in C/S communication.		
Available via	Std_Types.h		

⌋

[SWS_Std_00017]

Upstream requirements: SRS_BSW_00305

⌈The Std_MessageTypeType shall be used ot encode the different types of messages exchanged in AUTOSAR. - Currently this encoding is limited to the distinction between requests and responses in C/S communication.⌋

Note: In future AUTOSAR release, the literals for this type may be extended with additional message types.

8.1.5 Std_MessageResultType

[SWS_Std_91002] Definition of datatype Std_MessageResultType

Upstream requirements: SRS_BSW_00305

⌈

Name	Std_MessageResultType		
Kind	Type		
Derived from	uint8		
Range	STD_MESSAGERESULT_ OK	0x00	STD_MESSAGERESULT_OK
	STD_MESSAGERESULT_ ERROR	0x01	Messageresult for an ERROR response
	0x02-0x3F	0x02	reserverd for future message results
Description	This type is used to encode different types of results for response messages. - Currently this encoding is limited to the distinction between OK and ERROR responses.		

▽

△

Available via	Std_Types.h

⌋

[SWS_Std_00019]

Upstream requirements: SRS_BSW_00305

⌈The Std_MessageResultType shall be used ot encode the different types of results for response messages. - Currently this encoding is limited to the distinction between OK and ERROR responses.⌋

Note: In future AUTOSAR release, the literals for this type may be extended with additional result types.

8.1.6 Std_ExtractProtocolHeaderFieldsType

[SWS_Std_91003] Definition of datatype Std_ExtractProtocolHeaderFieldsType

Upstream requirements: SRS_BSW_00004

⌈

Name	Std_ExtractProtocolHeaderFieldsType	
Kind	Function Pointer	
Syntax	`Std_ReturnType (*Std_ExtractProtocolHeaderFieldsType) ( const uint8* buffer, uint32 bufferLength, Std_MessageTypeType* messageType, Std_MessageResultType* messageResult )`	
Parameters (in)	buffer	Buffer allocated by the RTE, where the transformed data has to be stored by the transformer
	bufferLength	Length of the buffer
Parameters (inout)	None	
Parameters (out)	messageType	Canonical representation of the message type (extracted from the transformers protocol header).
	messageResult	Canonical representation of the message result type (extracted from the transformers protocol header).
Return value	Std_ReturnType	–
Description	Type for the function pointer to extract the relevant protocol header fields of the message and the type of the message result of a transformer. - At the time being, this is limited to the types used for C/S communication (i.e., REQUEST and RESPONSE and OK and ERROR).	
Available via	Std_Types.h	

⌋

8.2 Symbol definitions

8.2.1 E_OK, E_NOT_OK

[SWS_Std_00006] Definition of datatype E_OK, E_NOT_OK

Upstream requirements: SRS_BSW_00357

⌈

Name	E_OK, E_NOT_OK		
Kind	Enumeration		
Range	E_OK	0x00u	–
	E_NOT_OK	0x01u	–
Description	Because E_OK is already defined within OSEK, the symbol E_OK has to be shared. To avoid name clashes and redefinition problems, the symbols have to be defined in the following way (approved within implementation): #ifndef STATUSTYPEDEFINED #define STATUSTYPEDEFINED #define E_OK 0x00u typedef unsigned char StatusType; /* OSEK compliance */ #endif #define E_NOT_OK 0x01u		
Available via	Std_Types.h		

⌋

8.2.2 STD_HIGH, STD_LOW

[SWS_Std_00007] Definition of datatype STD_HIGH, STD_LOW

Upstream requirements: SRS_BSW_00348

⌈

Name	STD_HIGH, STD_LOW		
Kind	Enumeration		
Range	STD_LOW	0x00u	–
	STD_HIGH	0x01u	–
Description	The symbols STD_HIGH and STD_LOW shall be defined as follows: #define STD_HIGH 0x01u /* Physical state 5V or 3.3V */ #define STD_LOW 0x00u /* Physical state 0V */		
Available via	Std_Types.h		

⌋

8.2.3 STD_ACTIVE, STD_IDLE

[SWS_Std_00013] Definition of datatype STD_ACTIVE, STD_IDLE

Upstream requirements: SRS_BSW_00348

⌈

Name	STD_ACTIVE, STD_IDLE		
Kind	Enumeration		
Range	STD_IDLE	0x00u	–
	STD_ACTIVE	0x01u	–
Description	The symbols STD_ACTIVE and STD_IDLE shall be defined as follows: #define STD_ACTIVE 0x01u /* Logical state active */ #define STD_IDLE 0x00u /* Logical state idle */		
Available via	Std_Types.h		

⌋

8.2.4 STD_ON, STD_OFF

[SWS_Std_00010] Definition of datatype STD_ON, STD_OFF

Upstream requirements: SRS_BSW_00348

⌈

Name	STD_ON, STD_OFF		
Kind	Enumeration		
Range	STD_OFF	0x00u	–
	STD_ON	0x01u	–
Description	The symbols STD_ON and STD_OFF shall be defined as follows: #define STD_ON 0x01u #define STD_OFF 0x00u		
Available via	Std_Types.h		

⌋

8.2.5 NULL_PTR

[SWS_Std_00031] Definition of datatype NULL_PTR

Upstream requirements: SRS_BSW_00480

⌈

Name	NULL_PTR
Kind	Pointer
Type	void*

▽

△

Description	The implementation shall provide the NULL_PTR define with a void pointer to zero definition. ((void *)0)
Available via	Std_Types.h

⌋

8.3 Function definitions

Not applicable.

9 Sequence diagrams

Not applicable.

10 Configuration specification

Not applicable.

A Not applicable requirements

[SWS_Std_NA_00001]

Upstream requirements: SRS_BSW_00384, SRS_BSW_00461, SRS_BSW_00478, SRS_BSW_00101, SRS_BSW_00168, SRS_BSW_00336, SRS_BSW_00369, SRS_BSW_00375, SRS_BSW_00406, SRS_BSW_00424, SRS_BSW_00425, SRS_BSW_00426, SRS_BSW_00427, SRS_BSW_00428, SRS_BSW_00432, SRS_BSW_00433

⌈The standard types only provide a header file with types and symbols. It does not provide code nor require any other BSW module.⌋

[SWS_Std_NA_00002]

Upstream requirements: SRS_BSW_00403, SRS_BSW_00159, SRS_BSW_00167, SRS_BSW_00171, SRS_BSW_00344, SRS_BSW_00345, SRS_BSW_00380, SRS_BSW_00383, SRS_BSW_00388, SRS_BSW_00389, SRS_BSW_00390, SRS_BSW_00392, SRS_BSW_00393, SRS_BSW_00395, SRS_BSW_00396, SRS_BSW_00397, SRS_BSW_00398, SRS_BSW_00399, SRS_BSW_00400, SRS_BSW_00404, SRS_BSW_00405, SRS_BSW_00419

⌈The standard types does not require nor has any configuration.⌋

[SWS_Std_NA_00003]

Upstream requirements: SRS_BSW_00469, SRS_BSW_00470, SRS_BSW_00471, SRS_BSW_00472, SRS_BSW_00323, SRS_BSW_00337, SRS_BSW_00339, SRS_BSW_00385, SRS_BSW_00386, SRS_BSW_00409, SRS_BSW_00417, SRS_BSW_00452, SRS_BSW_00458, SRS_BSW_00497

⌈The standard types does not provide any kind of error handling.⌋

[SWS_Std_NA_00004]

Upstream requirements: SRS_BSW_00490

⌈The standard types does not support security events.⌋

[SWS_Std_NA_00999]

Upstream requirements: SRS_BSW_00170, SRS_BSW_00416, SRS_BSW_00422, SRS_BSW_00423, SRS_BSW_00429, SRS_BSW_00491

⌈These requirements are not applicable to this specification.⌋

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_Std_NA_00999]

B.1.2 Changed Specification Items in R22-11

[SWS_Std_00005] [SWS_Std_00006] [SWS_Std_00007] [SWS_Std_00010] [SWS_Std_00013] [SWS_Std_00015] [SWS_Std_00021] [SWS_Std_00022] [SWS_Std_00024] [SWS_Std_00029] [SWS_Std_00031] [SWS_Std_91001] [SWS_Std_91002] [SWS_Std_91003]

B.1.3 Deleted Specification Items in R22-11

[SWS_Std_00027] [SWS_Std_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

[SWS_Std_00028]

B.2.3 Deleted Specification Items in R23-11

none

B.3 Requirement History of this Document According to AUTOSAR Release R24-11

B.3.1 Added Specification Items in R24-11

none

B.3.2 Changed Specification Items in R24-11

none

B.3.3 Deleted Specification Items in R24-11

none

B.4 Requirement History of this Document According to AUTOSAR Release R25-11

B.4.1 Added Specification Items in R25-11

none

B.4.2 Changed Specification Items in R25-11

[SWS_Std_00005] [SWS_Std_00029] [SWS_Std_00031]

B.4.3 Deleted Specification Items in R25-11

[SWS_Std_00014] [SWS_Std_00028] [SWS_Std_00030]

B.5 Requirement History of this Document According to AUTOSAR Release R26-11

B.5.1 Added Specification Items in R26-11

none

B.5.2 Changed Specification Items in R26-11

none

B.5.3 Deleted Specification Items in R26-11

[SWS_Std_00015]