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Date	Version	Changed by	Change Description
13.09.2010	1.3.0	AUTOSAR Administration	• Changed <Module> to STD_TYPES in default parameters • Legal disclaimer revised
29.11.2007	1.2.0	AUTOSAR Administration	• Add Module ID for Complex Drivers • Document meta information extended • Small layout adaptations made
24.01.2007	1.1.1	AUTOSAR Administration	• “Advice for users” revised • “Revision Information” added
04.12.2006	1.1.0	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. • Legal disclaimer revised
31.05.2005	1.0.0	AUTOSAR Administration	Initial Release

Disclaimer

Advice for users

AUTOSAR Specification Documents may contain exemplary items (exemplary reference models, "use cases", and/or references to exemplary technical solutions, devices, processes or software).

Any such exemplary items are contained in the Specification Documents for illustration purposes only, and they themselves are not part of the AUTOSAR Standard. Neither their presence in such Specification Documents, nor any later documentation of AUTOSAR conformance of products actually implementing such exemplary items, imply that intellectual property rights covering such exemplary items are licensed under the same rules as applicable to the AUTOSAR Standard.

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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

Acronyms and abbreviations that have a local scope are not contained in the AUTOSAR glossary. These must appear in a local glossary.

Acronym:	***Description:***
API	Application Programming Interface
OSEK/VDX	Offene Systeme und deren Schnittstellen für die Elektronik im Kraftfahrzeug

Abreviation:	***Description:***
STD	Standard

3 Related documentation

3.1 Input documents

[1] General Requirements on Basic Software Modules
AUTOSAR_SRS_General.pdf

[2] General Requirements on SPAL
AUTOSAR_SRS_SPAL_General.pdf

[3] Specification of RTE Software
AUTOSAR_SWS_RTE.pdf

[4] AUTOSAR Basic Software Module Description Template,
AUTOSAR_BSW_Module_Description.pdf

3.2 Related standards and norms

[5] OSEK/VDX Operating System, Version 2.2.2
www.osek-vdx.org/os222.pdf

[6] ISO/IEC 9899:1990 Programming Language – C

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:

1. AUTOSAR has to maintain network compatibility with legacy ECUs, but no software architecture compatibility with legacy software (decision acknowledged by AUTOSAR Steering Committee, december 2004)
2. 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

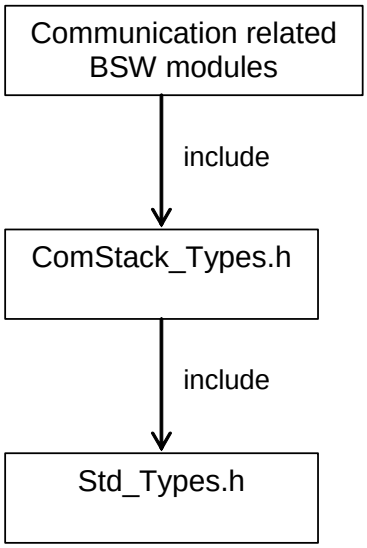
The standard types header file defines standard types based on the platform types header file (Platform_Types.h).

5.2 File structure

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

5.2.1 Communication related BSW modules

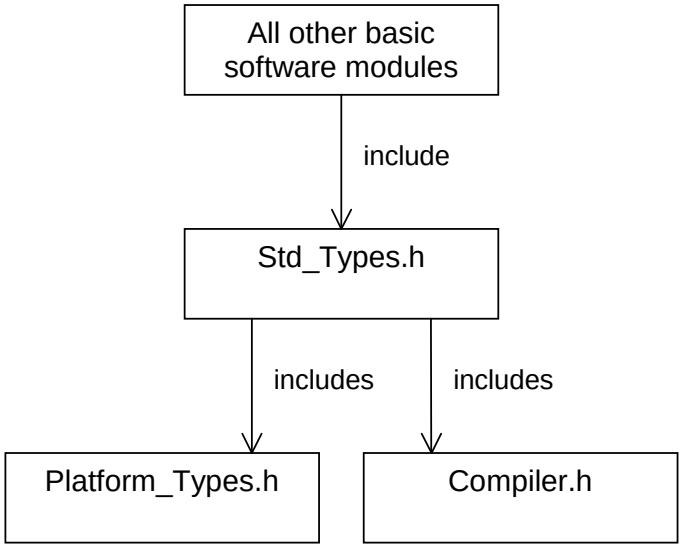
STD016: : The include file structure shall be as follows:



- `ComStack_Types.h` shall include `Std_Types.h`
- Communication related basic software modules shall include `ComStack_Types.h`

5.2.2 Non Communication related BSW modules

STD001: The include file structure shall be as follows:



- `Std_Types.h` shall include `Platform_Types.h`
- `Std_Types.h` shall include `Compiler.h`
- All other basic software modules shall include `Std_Types.h`

6 Requirements traceability

Document: General Requirements on Basic Software Modules

Requirement	***Satisfied by***
[BSW00300] Module naming convention [approved]	Not applicable (this is only a header file specification)
[BSW00301] Limit imported information [approved]	Not applicable (this is only a header file specification)
[BSW00302] Limit exported information [approved]	Not applicable (this is only a header file specification)
[BSW00304] AUTOSAR integer data types [approved]	Not applicable (this is only a header file specification)
[BSW00305] Self-defined data types naming convention [approved]	Not applicable (this is only a header file specification)
[BSW00306] Avoid direct use of compiler and platform specific keywords [approved]	Not applicable (this is only a header file specification)
[BSW00307] Global variables naming convention [approved]	Not applicable (this is only a header file specification)
[BSW00308] Definition of global data [approved]	Not applicable (this is only a header file specification)
[BSW00309] Global data with read-only constraint [approved]	Not applicable (this is only a header file specification)
[BSW00310] API naming convention [approved]	Not applicable (this is only a header file specification)
[BSW00312] Shared code shall be reentrant [approved]	Not applicable (this is only a header file specification)
[BSW00314] Separation of interrupt frames and service routines [approved]	Not applicable (this is only a header file specification)
[BSW00318] Format of module version numbers [approved]	STD002
[BSW00321] Enumeration of module version numbers [approved]	Not applicable (this is only a header file specification)
[BSW00324] Do not use HIS I/O Library [approved]	Not applicable (this is only a header file specification)
[BSW00325] Runtime of interrupt service routines [approved]	Not applicable (this is only a header file specification)
[BSW00326] Transition from ISRs to OS tasks [approved]	Not applicable (this is only a header file specification)
[BSW00327] Error values naming convention [approved]	Not applicable (this is only a header file specification)
[BSW00328] Avoid duplication of code [approved]	Not applicable (this is only a header file specification)
[BSW00329] Avoidance of generic interfaces [approved]	Not applicable (this is only a header file specification)
[BSW00330] Usage of macros / inline functions instead of functions [approved]	Not applicable (this is only a header file specification)
[BSW00331] Separation of error and status values [approved]	Not applicable (this is only a header file specification)
[BSW00333] Documentation of callback function context [approved]	Not applicable (this is only a header file specification)
[BSW00334] Provision of XML file [approved]	Not applicable (this is only a header file specification)
[BSW00335] Status values naming convention [approved]	Not applicable (this is only a header file specification)
[BSW00341] Microcontroller compatibility documentation [approved]	Not applicable (this is only a header file specification)
[BSW00342] Usage of source code and object	Not applicable

code [approved]	(this is only a header file specification)
[BSW00343] Specification and configuration of time [approved]	Not applicable (this is only a header file specification)
[BSW00341] Microcontroller compatibility documentation [approved]	Not applicable (this is only a header file specification)
[BSW00346] Basic set of module files [approved]	Not applicable (this is only a header file specification)
[BSW00347] Naming separation of different instances of BSW drivers [approved]	Not applicable (this is only a header file specification)
[BSW00350] Development error detection keyword [approved]	Not applicable (this is only a header file specification)
[BSW00353] Platform specific type header [approved]	Not applicable (this is only a header file specification)
[BSW00355] Do not redefine AUTOSAR integer data types [approved]	Not applicable (this is only a header file specification)
[BSW00350] Development error detection keyword [approved]	Not applicable (this is only a header file specification)
[BSW00358] Return type of init() functions [approved]	Not applicable (this is only a header file specification)
[BSW00359] Return type of callback functions [approved]	Not applicable (this is only a header file specification)
[BSW00360] Parameters of callback functions [approved]	Not applicable (this is only a header file specification)
[BSW00361] Compiler specific language extension header [approved]	Not applicable (this is only a header file specification)
[BSW00370] Separation of callback interface from API [approved]	Not applicable (this is only a header file specification)
[BSW00371] Do not pass function pointers via API [approved]	Not applicable (this is only a header file specification)
[BSW00373] Main processing function naming convention [approved]	Not applicable (this is only a header file specification)
[BSW00374] Module vendor identification [approved]	Not applicable (this is only a header file specification)
[BSW00376] Return type and parameters of main processing functions [approved]	Not applicable (this is only a header file specification)
[BSW00377] Module specific API return types [approved]	Not applicable (this is only a header file specification)
[BSW00378] AUTOSAR boolean type [approved]	Not applicable (this is only a header file specification)
[BSW00379] Module identification [approved]	Not applicable (this is only a header file specification)
[BSW00401] Documentation of multiple instances of configuration parameters [approved]	Not applicable (this is only a header file specification)
[BSW00408] Configuration parameter naming convention [approved]	Not applicable (this is only a header file specification)
[BSW00410] Compiler switches shall have defined values [approved]	Not applicable (this is only a header file specification)
[BSW00411] Get version info keyword [approved]	Not applicable (this is only a header file specification)
[BSW00413] Accessing instances of BSW modules [approved]	Not applicable (this is only a header file specification)
[BSW00414] Parameter of init function [approved]	Not applicable (this is only a header file specification)
[BSW00415] User dependent include files [approved]	Not applicable (this is only a header file specification)
[BSW005] No hard coded horizontal interfaces within MCAL [approved]	Not applicable (this is only a header file specification)
[BSW006] Platform independency [approved]	Not applicable

	(this is only a header file specification)
[BSW007] HIS MISRA C [approved]	Not applicable (this is only a header file specification)
[BSW009] Module User Documentation [approved]	Not applicable (this is only a header file specification)
[BSW010] Memory resource documentation [approved]	Not applicable (this is only a header file specification)
[BSW158] Separation of configuration from implementation [approved]	Not applicable (this is only a header file specification)
[BSW160] Human-readable configuration data [approved]	Not applicable (this is only a header file specification)
[BSW161] Microcontroller abstraction [approved]	Not applicable (this is only a header file specification)
[BSW162] ECU layout abstraction [approved]	Not applicable (this is only a header file specification)
[BSW164] Implementation of interrupt service routines [approved]	Not applicable (this is only a header file specification)
[BSW172] Compatibility and documentation of scheduling strategy [approved]	Not applicable (this is only a header file specification)
[BSW00344] Reference to link-time configuration	Not applicable (this is only a header file specification)
[BSW00404] Reference to post build time configuration	Not applicable (this is only a header file specification)
[BSW00405] Reference to multiple configuration sets	Not applicable (this is only a header file specification)
[BSW00345] Pre-compile-time configuration	Not applicable (this is only a header file specification)
[BSW159] Tool-based configuration	Not applicable (this is a tool requirement)
[BSW167] Static configuration checking	Not applicable (this is only a header file specification)
[BSW171] Configurability of optional functionality	Not applicable (this is only a header file specification)
[BSW170] Data for reconfiguration of AUTOSAR SW-Components	Not applicable (this is only a header file specification)
[BSW00380] Separate C-Files for configuration parameters	Not applicable (this is only a header file specification)
[BSW00419] Separate C-Files for pre-compile time configuration parameters	Not applicable (this is only a header file specification)
[BSW00381] Separate configuration header file for pre-compile time parameters	Not applicable (this is only a header file specification)
[BSW00412] Separate H-File for configuration parameters	Not applicable (this is only a header file specification)
[BSW00383] List dependencies of configuration files	Not applicable (this is only a header file specification)
[BSW00384] List dependencies to other modules	STD001
[BSW00387] Specify the configuration class of callback function	Not applicable (this is only a header file specification)
[BSW00388] Introduce containers	Not applicable (this is only a header file specification)
[BSW00389] Containers shall have names	Not applicable (this is only a header file specification)
[BSW00390] Parameter content shall be unique within the module	Not applicable (this is only a header file specification)
[BSW00391] Parameter shall have unique names	Not applicable (this is only a header file specification)

[BSW00392] Parameters shall have a type	Not applicable (this is only a header file specification)
[BSW00393] Parameters shall have a range	Not applicable (this is only a header file specification)
[BSW00394] Specify the scope of the parameters	Not applicable (this is only a header file specification)
[BSW00395] List the required parameters (per parameter)	Not applicable (this is only a header file specification)
[BSW00396] Configuration classes	Not applicable (this is only a header file specification)
[BSW00397] Pre-compile-time parameters	Not applicable (this is only a header file specification)
[BSW00398] Link-time parameters	Not applicable (this is only a header file specification)
[BSW00399] Loadable Post-build time parameters	Not applicable (this is only a header file specification)
[BSW00400] Selectable Post-build time parameters	Not applicable (this is only a header file specification)
[BSW00402] Published information	Partly fulfilled by STD002. Vendor version number for this header file not necessary.
[BSW00375] Notification of wake-up reason	Not applicable (this is only a header file specification)
[BSW101] Initialization interface	Not applicable (this is only a header file specification)
[BSW00416] Sequence of Initialization	Not applicable (this is only a header file specification)
[BSW00406] Check module initialization	Not applicable (this is only a header file specification)
[BSW168] Diagnostic Interface of SW components	Not applicable (this is only a header file specification)
[BSW00407] Function to read out published parameters	Not applicable (this is only a header file specification)
[BSW00423] Usage of SW-C template to describe BSW modules with AUTOSAR Interfaces	Not applicable (this is only a header file specification)
[BSW00424] BSW main processing function task allocation	Not applicable (this is only a header file specification)
[BSW00425] Trigger conditions for schedulable objects	Not applicable (this is only a header file specification)
[BSW00426] Exclusive areas in BSW modules	Not applicable (this is only a header file specification)
[BSW00427] ISR description for BSW modules	Not applicable (this is only a header file specification)
[BSW00428] Execution order dependencies of main processing functions	Not applicable (not related to this specification)
[BSW00429] Restricted BSW OS functionality access	Not applicable (this is only a header file specification)
[BSW00431] The BSW Scheduler module implements task bodies	Not applicable (not related to this specification)
[BSW00432] Modules should have separate main processing functions for read/receive and write/transmit data path	Not applicable (this is only a header file specification)
[BSW00433] Calling of main processing functions	Not applicable (not related to this specification)
[BSW00434] The Schedule Module shall provide an API for exclusive areas	Not applicable (not related to this specification)
[BSW00336] Shutdown interface	Not applicable (this is only a header file specification)
[BSW00337] Classification of errors	Not applicable

	(this is only a header file specification)
[BSW00338] Detection and Reporting of development errors	Not applicable (this is only a header file specification)
[BSW00369] Do not return development error codes via API	Not applicable (this is only a header file specification)
[BSW00339] Reporting of production relevant error status	Not applicable (this is only a header file specification)
[BSW00348] Standard type header	STD001, STD003
[BSW00357] Standard API return type	STD005, STD006, STD011
[BSW00421] Reporting of production relevant error events	Not applicable (this is only a header file specification)
[BSW00422] Debouncing of production relevant error status	Not applicable (not related to this specification)
[BSW00420] Production relevant error event rate detection	Not applicable (not related to this specification)
[BSW00417] Reporting of Error Events by Non-Basic Software	Not applicable (this is only a header file specification)
[BSW00323] API parameter checking	Not applicable (this is only a header file specification)
[BSW004] Version check	Check has to be done by a specific tool. Version numbers provided by STD015.
[BSW00409] Header files for production code error IDs	Not applicable (this is only a header file specification)
[BSW00385] List possible error notifications	Not applicable (this is only a header file specification)
[BSW00386] Configuration for detecting an error	Not applicable (this is only a header file specification)

7 Functional specification

7.1 General issues

STD003: The file name of the standard types header file shall be ‘`Std_Types.h`’.

STD004: It is not allowed to add any project or supplier specific extension to this file. Any extension invalidates the AUTOSAR conformity.

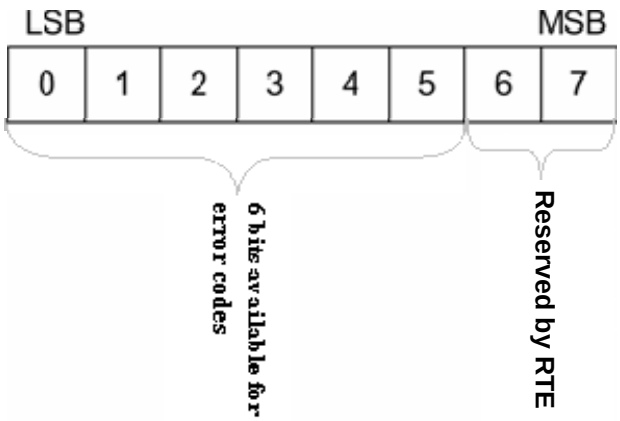
STD014: The standard types header file shall be protected against multiple inclusion:

```
#ifndef STD_TYPES_H
#define STD_TYPES_H
..
/*
 * Contents of file
 */
..
#endif /* STD_TYPES_H */
```

8 API specification

8.1 Type definitions

8.1.1 Std_ReturnType

Type:	uint8	
Range:	E_OK	see 8.2.1, STD006
	E_NOT_OK	see 8.2.1, STD006
	0x02-0x3F	Available to user specific errors
Description:	**STD005**: 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;` **STD011**:, 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. 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. 	

8.1.2 Std_VersionInfoType

Type:	`typedef struct`
	`{`
	`  uint16 vendorID;`
	`  uint16 moduleID;`
	`  uint8 instanceID;`
	`  uint8 sw_major_version;`
	`  uint8 sw_minor_version;`
	`  uint8 sw_patch_version;`
	`} Std_VersionInfoType;`

Range:	--	--
	--	--
Description:	**STD015** : This type shall be used to request the version of a BSW module using the <Module name>_GetVersionInfo() function.	

8.2 Symbol definitions

8.2.1 E_OK, E_NOT_OK

Symbol/Value:	E_OK	0x00
Symbol/Value:	E_NOT_OK	0x01

Description:	**STD006**: 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  0x00`
	
	`  typedef unsigned char StatusType; /* OSEK compliance */`
	`#endif`
	
	`#define E_NOT_OK  0x01`	

8.2.2 STD_HIGH, STD_LOW

Symbol/Value:	STD_HIGH	0x01
Symbol/Value:	STD_LOW	0x00

Description:	**STD007**: The symbols STD_HIGH and STD_LOW shall be defined as follows:
	`#define STD_HIGH  0x01  /* Physical state 5V or 3.3V */`
	`#define STD_LOW  0x00  /* Physical state 0V */`	

8.2.3 STD_ACTIVE, STD_IDLE

Symbol/Value:	STD_ACTIVE	0x01
Symbol/Value:	STD_IDLE	0x00

Description:	**STD013**: The symbols STD_ACTIVE and STD_IDLE shall be defined as follows:
	`#define STD_ACTIVE  0x01  /* Logical state active */`
	`#define STD_IDLE  0x00  /* Logical state idle */`	

8.2.4 STD_ON, STD_OFF

Symbol/Value:	STD_ON	0x01
Symbol/Value:	STD_OFF	0x00

Description:	**STD010**: The symbols STD_ON and STD_OFF shall be defined as follows:
	`#define STD_ON 0x01`
	`#define STD_OFF 0x00`	

8.3 Function definitions

Not applicable.

9 Sequence diagrams

Not applicable.

10 Configuration specification

10.1 Published parameters

STD002: The following table specifies parameters that shall be published within the platform types header file and also in the module's description file.

The standard common published information like

vendorId (STD_TYPES_VENDOR_ID),
moduleId (STD_TYPES_MODULE_ID),
arMajorVersion (STD_TYPES_AR_MAJOR_VERSION),
arMinorVersion (STD_TYPES_ AR_MINOR_VERSION),
arPatchVersion (STD_TYPES_ AR_PATCH_VERSION),
swMajorVersion (STD_TYPES_SW_MAJOR_VERSION),
swMinorVersion (STD_TYPES_ SW_MINOR_VERSION),
swPatchVersion (STD_TYPES_ SW_PATCH_VERSION),
vendorApiInfix (STD_TYPES_VENDOR_API_INFIX)

is provided in the BSW Module Description Template (see [4] Figure 4.1 and Figure 7.1).

Additional published parameters are listed below if applicable for this module.