



Elektrobit

# EB tresos<sup>®</sup> E2E Profile 4 documentation

product release 8.8.5



Elektrobit Automotive GmbH  
Am Wolfsmantel 46  
91058 Erlangen, Germany  
Phone: +49 9131 7701 0  
Fax: +49 9131 7701 6333  
Email: [info.automotive@elektrobit.com](mailto:info.automotive@elektrobit.com)

## Technical support

<https://www.elektrobit.com/support>

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# 1. Overview of EB tresos E2E Profile 4 documentation

Welcome to the EB tresos E2E Profile 4 (E2EP04) product documentation.

This document provides:

- ▶ [Chapter 2, “E2EP04 release notes”](#): release notes for the E2EP04 modules
- ▶ [Chapter 3, “E2EP04 user's guide”](#): containing background information and instructions
- ▶ [Chapter 4, “E2EP04 module references”](#): information about configuration parameters and the application programming interface

## 2. E2EP04 release notes

### 2.1. Overview

This chapter provides the E2EP04 product specific release notes. General release notes that are applicable to all products are provided in the EB tresos AutoCore Generic documentation. Refer to the general release notes in addition to the product release notes documented here.

### 2.2. Scope of the release

#### 2.2.1. Configuration tool

Your release of EB tresos AutoCore is compatible with the release of the EB tresos Studio configuration tool:

- ▶ EB tresos Studio: 28.2.0 b211016-0103

#### 2.2.2. AUTOSAR modules

The following table lists the AUTOSAR modules that are part of this E2EP04 release.

Module name	AUTOSAR version and revision	SWS version and revision	Module version	Supplier
<a href="#">E2E</a>	4.2.1 []	4.2.1 [0000]	2.0.18	Elektrobit Automotive GmbH
<a href="#">E2EP04</a>	4.2.1 []	4.2.1 [0000]	1.0.11	Elektrobit Automotive GmbH

Table 2.1. Hardware-Independent Modules specified by the AUTOSAR standard

#### 2.2.3. EB (Elektrobit) modules

The following table lists all modules which are part of this release but are not specified by the AUTOSAR standard. These modules include tooling developed by EB or they may hold files shared by all other modules.



Module name	Module version	Supplier
<a href="#">SCrc</a>	2.0.12	Elektrobit Automotive GmbH

Table 2.2. Modules not specified by the AUTOSAR standard

## 2.2.4. MCAL modules and EB tresos AutoCore OS

For information about MCAL modules and OS, refer to the respective documentation, which is available as PDF at `$TRESOS_BASE/doc/3.0_EB_tresos_AutoCore_OS` and `$TRESOS_BASE/doc/5.0_MCAL_modules`<sup>1</sup>. It is also available in the online help in EB tresos Studio. Browse to the folders `EB tresos AutoCore OS` and `MCAL modules`.

## 2.3. Module release notes

### 2.3.1. E2E module release notes

- ▶ AUTOSAR R4.2 Rev 1
- ▶ AUTOSAR SWS document version: 4.2.1
- ▶ Module version: 2.0.18.B520150
- ▶ Supplier: Elektrobit Automotive GmbH

#### 2.3.1.1. Change log

This chapter lists the changes between different versions.

##### Module version 2.0.18

2021-03-05

- ▶ Updated preprocessor include guards to be PC-lint compatible

##### Module version 2.0.17

2020-10-23

---

<sup>1</sup>`$TRESOS_BASE` is the location at which you installed EB tresos Studio.

- ▶ Internal module improvement. This module version update does not affect module functionality
- ▶ Implemented independency of E2E\_Mem.h from Base module

#### **Module version 2.0.16**

2020-06-19

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.15**

2020-02-21

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.14**

2020-01-24

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.13**

2019-10-11

- ▶ Improved implementation of signal unpack macros
- ▶ Improved range check implementation of signal pack macros
- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.12**

2019-07-05

- ▶ ASCE2E-766 Fixed known issue: Wrong safety related ComXf serialization of 64bit ISignalGroup members
- ▶ ASCE2E-771, ASCCOMXF-492 Fixed known issue: Invalid safety-related ComXf support for XfrmBuffer-LengthType configured to UINT32 (Note: requires also ComXf module update)

#### **Module version 2.0.11**

2019-06-14

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.10**

2019-02-15

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.9**

2018-10-26

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.8**

2018-05-29

- ▶ ASCE2E-626 Fixed known issue: Undefined behavior for safety related ComXf serialization

#### **Module version 2.0.7**

2018-03-16

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.6**

2018-02-16

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.5**

2017-10-27

- ▶ Implemented support for configurable type of BufferLength
- ▶ Implemented profile specific parts from E2E transformer in E2E profiles and library

#### **Module version 2.0.4**

2017-09-22

- ▶ Improved implementation of signal pack and unpack macros
- ▶ Implemented 64 bit signal pack and unpack macros
- ▶ Switch from MISRA-C:2004 to MISRA-C:2012

#### **Module version 2.0.3**

2017-06-30

- ▶ Implemented signal pack and unpack macros

#### **Module version 2.0.2**

2015-06-19

- ▶ Added additional return values required for E2E transformer concept
- ▶ Implemented deterministic start-up behavior for E2E State Machine according to Bugzilla #67553

#### **Module version 2.0.1**

2013-02-15

- ▶ Provide a Basic Software Module Description that specifies the Memory Mappings

#### **Module version 2.0.0**

2012-06-22

- ▶ Update to ASR 4.0 Rev3

#### **Module version 1.0.4**

2011-09-16

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 1.0.3**

2011-05-20

- ▶ Update of version macros and Info

- ▶ Usage of unix line endings

#### **Module version 1.0.2**

2010-12-23

- ▶ Each profile is implemented as an individual module
- ▶ The E2E library shall use the SCrc module instead of the AUTOSAR Crc module

#### **Module version 1.0.1**

2010-11-30

- ▶ Enumeration E2E\_P02ReceiverStateType must have defined values
- ▶ Removed dead code in E2E Library
- ▶ Input parameter is not correctly checked against Null pointer

#### **Module version 1.0.0**

2010-11-12

- ▶ Initial release

### **2.3.1.2. New features**

- ▶ No new features have been added since the last release.

### **2.3.1.3. EB-specific enhancements**

This chapter lists the enhancements provided by the module.

- ▶ Support for the usage with AUTOSAR E2E Transformer

Description:

In addition to AUTOSAR version R4.0 Rev 3, the following additional return values according to AUTOSAR release 4.2.1 are provided:

- ▶ E2E\_P\_OK
- ▶ E2E\_P\_REPEATED
- ▶ E2E\_P\_WRONGSEQUENCE

- ▶ E2E\_P\_ERROR

- ▶ Deterministic initialization behavior for E2E State Machine

Description:

In addition to AUTOSAR release 4.2.1, Bugzilla RfC 67553 is incorporated. That is, a new generic profile status type `E2E_P_NONEWDATA` is introduced in case no new data was received in the actual receive cycle. See also [http://www.autosar.org/bugzilla/show\\_bug.cgi?id=67553](http://www.autosar.org/bugzilla/show_bug.cgi?id=67553).

#### 2.3.1.4. Deviations

This chapter lists the deviations of the module from the AUTOSAR standard.

- ▶ [ASCE2E-10] No support for building customized E2E Profiles

Description:

The following functions are not supported:

- ▶ E2E\_CRC8\*
- ▶ E2E\_UpdateCounter

Rationale:

The generic E2E library is only used in combination with specific E2E profiles.

Requirements:

E2E0106, E2E0107, E2E0092, E2E0091, E2E0094, E2E0095, E2E0096, E2E0276, E2E0097, E2E0098, E2E0099

#### 2.3.1.5. Limitations

This chapter lists the limitations of the module. Refer to the module references chapter *Integration notes*, subsection *Integration requirements* for requirements on integrating this module.

- ▶ Packing of 64 bit signal types

Description:

In order to serialize 64-bit data types the following constraints apply to the configuration of a signal within a PDU:

- ▶ signal shall be byte aligned

- ▶ bit length shall be a multiple of 8
- ▶ the bitlength parameter value shall correlate with the value of the nbytes parameter
- ▶ Unpacking of 64 bit signal types

Description:

In order to deserialize 64-bit data types the following constraints apply to the configuration of a signal within a PDU:

- ▶ signal shall be byte aligned
- ▶ bitlength shall be a multiple of 8
- ▶ the bitlength parameter value shall correlate with the value of the nbytes parameter
- ▶ Range checks of 64 bit signal types

Description:

- ▶ Range checks for float signal types are not supported.
- ▶ Range checks for 64bit signal types are only supported on byte level.

### 2.3.1.6. Open-source software

E2E does not use open-source software.

## 2.3.2. E2EP04 module release notes

- ▶ AUTOSAR R4.2 Rev 1
- ▶ AUTOSAR SWS document version: 4.2.1
- ▶ Module version: 1.0.11.B520150
- ▶ Supplier: Elektrobit Automotive GmbH

### 2.3.2.1. Change log

This chapter lists the changes between different versions.

**Module version 1.0.11**  
2021-03-05

- ▶ Updated preprocessor include guards to be PC-lint compatible

#### **Module version 1.0.10**

2020-06-19

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 1.0.9**

2020-01-24

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 1.0.8**

2019-10-11

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 1.0.7**

2019-06-14

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 1.0.6**

2019-02-15

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 1.0.5**

2018-10-26

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 1.0.4**

2018-05-29



- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 1.0.3**

2017-10-27

- ▶ Implemented support for configurable type of BufferLength
- ▶ Implemented profile specific parts from E2E transformer in E2E profiles and library

#### **Module version 1.0.2**

2017-09-22

- ▶ Switch from MISRA-C:2004 to MISRA-C:2012

#### **Module version 1.0.1**

2017-08-25

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 1.0.0**

2015-06-19

- ▶ Initial release
- ▶ Implemented deterministic start-up behavior for E2E State Machine according to Bugzilla #67553

### **2.3.2.2. New features**

- ▶ No new features have been added since the last release.

### **2.3.2.3. EB-specific enhancements**

This chapter lists the enhancements provided by the module.

- ▶ Deterministic initialization behavior for E2E State Machine

Description:

In addition to AUTOSAR release 4.2.1, Bugzilla RfC 67553 is incorporated. That is, a new generic profile status type `E2E_P_NONEWDATA` is introduced if no new data is received in the actual receive cycle. For more information, see [http://www.autosar.org/bugzilla/show\\_bug.cgi?id=67553](http://www.autosar.org/bugzilla/show_bug.cgi?id=67553).

### 2.3.2.4. Deviations

This chapter lists the deviations of the module from the AUTOSAR standard.

- [ASCE2E-8] Configuration pointer is a pointer to const

Description:

In contrast to SWS\_E2E\_00338 and SWS\_E2E\_00339, the first argument of `E2E_P04Protect()`, and the first and third argument of `E2E_P04Check()` are pointers to const:

```
Std_ReturnType E2E_P04Protect(const E2E_P04ConfigType* Config, E2E_P04ProtectStateType*State, uint8*Data, uint16Length);
```

```
Std_ReturnType E2E_P04Check(const E2E_P04ConfigType* Config, E2E_P04CheckStateType*State, const uint8*Data, uint16Length);
```

For more information, see [https://www.autosar.org/bugzilla/show\\_bug.cgi?id=68903](https://www.autosar.org/bugzilla/show_bug.cgi?id=68903).

Rationale:

The E2E configuration is always constant and no write access is performed on it. Also the data must not be modified by `E2E_P04Check()`, so no write access is performed on it.

Requirements:

SWS\_E2E\_00338, SWS\_E2E\_00339

- [ASCE2E-34] The E2E library uses the Safety CRC module `SCrc` instead of the AUTOSAR `Crc` module

Description:

Instead of the standard AUTOSAR `Crc` module, a Safety CRC module named `SCrc` is used. That is, instead of `Crc_CalculateCRC32P4()` the function `SCrc_CalculateCRC32P4()` of the `SCrc` module is called.

Rationale:

The implementation of the `SCrc` library complies with the requirements for the development of safety-related software for the automotive domain.

Requirements:

SWS\_E2E\_00114, SWS\_E2E\_00329

► Memory abstraction according to AUTOSAR 4.0.3

Description:

In contrast to AUTOSAR which specifies to include file `E2E_MemMap.h` for memory abstraction, E2E Profile 04 includes file `MemMap.h`.

Rationale:

This is done for compatibility reasons with AUTOSAR 4.0.3.

Requirements:

SWS\_E2E\_00114

► Clarification for initial counter value after call to `E2E_P04CheckInit()`

Description:

In contrast to AUTOSAR which specifies to initialize the counter to 0 in requirement SWS\_E2E\_00378, the counter is set to the maximum value. For more information, see [https://www.autosar.org/bugzilla/show\\_bug.cgi?id=68745](https://www.autosar.org/bugzilla/show_bug.cgi?id=68745).

Requirements:

SWS\_E2E\_00378, SWS\_E2E\_00350

### 2.3.2.5. Limitations

This chapter lists the limitations of the module. Refer to the module references chapter *Integration notes*, subsection *Integration requirements* for requirements on integrating this module.

For this module no constraints and limitations are known.

### 2.3.2.6. Open-source software

E2EP04 does not use open-source software.

## 2.3.3. SCrc module release notes

- Module version: 2.0.12.B520150
- Supplier: Elektrobit Automotive GmbH

### 2.3.3.1. Change log

This chapter lists the changes between different versions.

#### **Module version 2.0.12**

2022-05-11

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.11**

2021-03-05

- ▶ Updated preprocessor include guards to be PC-lint compatible
- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.10**

2020-06-19

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.9**

2019-10-11

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.8**

2019-06-14

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.7**

2019-02-15

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.6**

2018-10-26

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.5**

2018-02-01

- ▶ Internal module improvement. This module version update does not affect module functionality

#### **Module version 2.0.4**

2017-09-22

- ▶ Switch from MISRA-C:2004 to MISRA-C:2012

#### **Module version 2.0.3**

2015-06-19

- ▶ Added CRC routines required for new E2E Profiles 4, 5, 6

#### **Module version 2.0.2**

2013-11-29

- ▶ Non-functional code improvements (Inspection findings, Consistent use of static qualifier).
- ▶ ASCSCRC-74 Fixed known issue: The SCrc module used a compiler abstraction macro of the Crc module.

#### **Module version 2.0.1**

2013-02-15

- ▶ Provide a Basic Software Module Description that specifies the Memory Mappings.

#### **Module version 2.0.0**

2012-06-22

- ▶ Update to ASR 4.0 Rev3 (New parameter isFirstCall in CalculateCRC APIs).

#### **Module version 1.0.8**

2011-09-16

- ▶ Non-functional code improvements.

#### **Module version 1.0.7**

2011-05-20

- ▶ Usage of unix line endings.

#### **Module version 1.0.6**

2011-04-20

- ▶ Correction of common published information.
- ▶ Correction of compiler abstraction.

#### **Module version 1.0.5**

2011-03-18

- ▶ Macro definitions for switching between Crc implementation of SCrc module or external Crc module.

#### **Module version 1.0.4**

2011-02-28

- ▶ The GetVersionInfoApi() removed from the SCrc module.

#### **Module version 1.0.3**

2011-02-14

- ▶ Elimination of misra violations.

#### **Module version 1.0.2**

2010-12-23

- ▶ Table-based 8-bit Crc routine according to SAE J1850 CRC.

#### **Module version 1.0.1**

2010-11-30

- ▶ Removed unintended header file in Crc.c.

#### **Module version 1.0.0**

2010-11-12

- ▶ Table-based 8-bit Crc routine with generator polynomial 0x2F.

### **2.3.3.2. New features**

- ▶ No new features have been added since the last release.

### **2.3.3.3. EB-specific enhancements**

This module is not part of the AUTOSAR specification.

### **2.3.3.4. Deviations**

This module is not part of the AUTOSAR specification.

### **2.3.3.5. Limitations**

This chapter lists the limitations of the module. Refer to the module references chapter *Integration notes*, subsection *Integration requirements* for requirements on integrating this module.

- ▶ For this module no limitations are known.

### **2.3.3.6. Open-source software**

Open-source software information is not available for this module.

## 3. E2EP04 user's guide

### 3.1. Overview

This user's guide describes the E2EP04 module. From this user's guide you learn the basic functionality of the E2EP04. You also learn which related modules are necessary to configure the E2EP04 module. The E2EP04 module reference provides further information on configuring the E2EP04 itself.

Note that this user's guide is intended for readers who have good knowledge of AUTOSAR and about the purpose of the E2EP04. The information provided here helps you to integrate the E2EP04 in your AUTOSAR project.

- ▶ [Section 3.2, “Background information”](#) provides an overview of the basic functionality of the E2EP04.
- ▶ [Section 3.3, “Configuring E2EP04”](#) provides information on related modules that are needed in order to configure the E2EP04.
- ▶ [Section 3.4, “E2EP04 integration notes”](#) provides notes for the integration of the E2EP04 module into your project.
- ▶ For details on how to configure the E2EP04 itself, see the parameter descriptions provided in the E2EP04 module reference [Chapter 4, “E2EP04 module references”](#) which is provided together with the dependent modules E2E and SCrc.

### 3.2. Background information

The general concept of end-to-end communication protection is described in the EB tresos E2E Protection Transformer documentation of the E2EXf module, based on the AUTOSAR E2E transformer specified in [2].

#### 3.2.1. Functional overview

##### 3.2.1.1. Safety mechanisms

This profile is based on E2E Profile 4 specified by AUTOSAR, see [1]. It is called from the virtual functional bus generated by the Rte module together with a previously called serializing transformer, e.g. ComXf, or SomeIpXf) to add protection information to the serialized data stream for the following communication paradigms:

- ▶ Non-blocking queued sender-receiver communication



E2EP04 provides APIs to add protection information at the sender to the result of a serializing transformer, e.g. `ComXf` or `SomeIpXf`. It also provides APIs to cyclically check for communication errors by using this information at the receiver. Its API functions are called by the `E2EXf` module.

The E2EP04 module uses the following safety mechanisms:

- ▶ **Cyclic redundancy check (CRC):** A 32-bit CRC is explicitly sent with polynomial in normal form `0x1F4ACFB13` with an initial value `0xFFFFFFFF` and a final XOR-value `0xFFFFFFFF`.
- ▶ **Sequence counter/alive counter:** A 16-bit sequence number is explicitly sent and incremented at every transmission request.
- ▶ **Data ID:** A system-wide unique 32-bit data ID is explicitly sent for every port data element.
- ▶ **Length:** A 16-bit number to support dynamic-size data.

The header of AUTOSAR E2E Profile 4 can be placed at a specific location in the protected data, by configuring the offset of the entire E2E header. [Figure 3.1, “Header layout of AUTOSAR E2E Profile 4.”](#) shows the header layout with a header offset equal to 0. The individual control data fields are encoded in Big Endian with the most significant byte first.

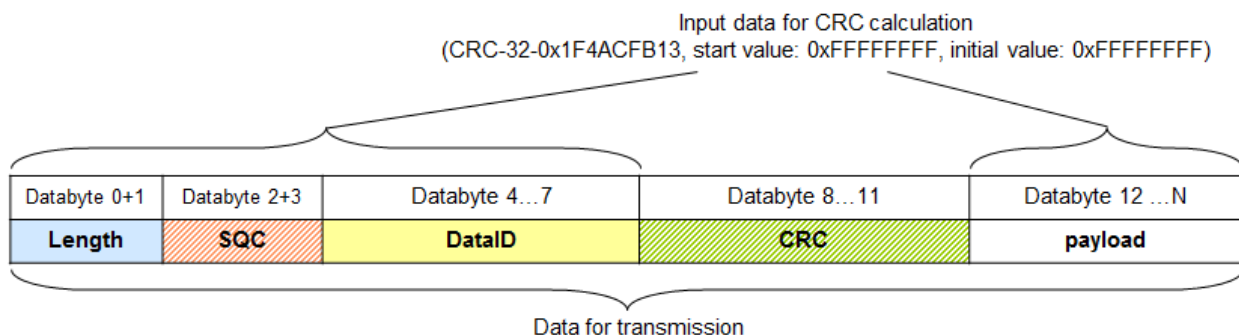


Figure 3.1. Header layout of AUTOSAR E2E Profile 4.

### 3.2.1.2. Failure modes and required safety mechanisms

The [Table 3.1, “Failure modes detection matrix for E2E Profile 4”](#) shows the failure modes and the required safety mechanisms of E2E Profile 4 with the different data ID variants for detection of the failure mode.

#### NOTE



#### Different data ID inclusion modes

The different data ID inclusion modes only limits the applicable range of data IDs which can be used to detect masquerading.

An `x` specifies that the failure mode can be detected by the safety mechanism implemented in the E2E Profile.

An (X) specifies a safety mechanism which is only required to implement another safety mechanism.

An A specifies that the failure mode can be detected by a safety mechanism implemented in the data sink.

Failure mode/ safety mechanism	Sequence counter	CRC	Data ID	Timeout detection
Unintended message repetition	X			
Message loss	X			A
Insertion of message	X	(X)	X	
Resequencing	X			
Message corruption		X		
Delayed reception				A
Addressing faults	(X)	(X)	X	
Masquerading	(X)	(X)	X	

Table 3.1. Failure modes detection matrix for E2E Profile 4

## 3.3. Configuring E2EP04

To configure the `E2EP04` module, add the module to your project using EB tresos Studio. This module does not provide any configuration parameters except a common published information. You find this information in the module references section of this document. You also find these in the parameter description in EB tresos Studio.

To use the `E2EP04` module, you must configure additional modules as outlined below:

- ▶ The `E2EP04` module requires API functions and data types from the `E2E` library module. This module does not provide any configuration parameters.
- ▶ The `E2EP04` module requires API functions and data types from the `SCrc` library module. This module does not provide any configuration parameters.
- ▶ The `E2EP04` module provides API functions and data types required from the `E2ESM` library module and from the `E2EXf` module. For more information on the `E2ESM` and `E2EXf` modules, see [\[1\]](#) and [\[2\]](#).

## 3.4. E2EP04 integration notes

You find general integration information in the EB tresos AutoCore Generic documentation.



In addition, you find module-specific information about exclusive areas, production errors and memory mapping in the module-specific integration notes. You find the module-specific integration notes in the module references chapter of this document. See [Chapter 4, “E2EP04 module references”](#) sub-section `Integration notes` in each module.

## 4. E2EP04 module references

### 4.1. Overview

This chapter provides module references for the E2EP04 product modules. These include a detailed description of all configuration parameters. Furthermore this chapter lists the application programming interface with all data types, constants and functions.

The content of the sections is sorted alphabetically according the EB tresos AutoCore Generic module names.

For further information on the functional behavior of these modules, refer to the chapter E2EP04 user's guide.

#### 4.1.1. Notation in EB module references

EB notation may differ from the AUTOSAR standard notation in the software specification documents (SWS). This section describes the notation of *default value* and *range* fields in the EB module references.

##### 4.1.1.1. Default value of configuration parameters

If there is no default value specified for a parameter, the default value field is omitted to prevent ambiguity with parameters that have -- as default values.

Example: The parameter `BswMCompuConstText` of the `BswM` module of EB tresos AutoCore Generic 8 Mode Management has no default value field, therefore it is omitted.

##### 4.1.1.2. Range information of configuration parameters

The range of a configuration parameter contains an upper and a lower boundary. However, in special cases the range of allowed values can be computed by means of an XPath function that is evaluated at configuration time. An XPath function can either be a standard `xpath:<function>()` or a custom `cxpath:<function>()` function. The range of a configuration parameter may be computed based on other configuration parameters that are referenced from the XPath function. For more information on custom XPath functions, see section *Custom XPath Functions API* of the EB tresos Studio developer's guide.

Example: The parameter `BswMCompuConstText` of the `BswM` module of EB tresos AutoCore Generic 8 Mode Management has the custom XPath function `cxpath:getCompuMethodsVT()` in the range field which provides the allowed values.

## 4.2. E2E

### 4.2.1. Configuration parameters

Containers included		
Container name	Multiplicity	Description
<a href="#">CommonPublishedInformation</a>	1..1	<b>Label:</b> Common Published Information Common container, aggregated by all modules. It contains published information about vendor and versions.
<a href="#">PublishedInformation</a>	1..1	<b>Label:</b> EB Published Information Additional published parameters not covered by Common-PublishedInformation container.

#### 4.2.1.1. CommonPublishedInformation

Parameters included	
Parameter name	Multiplicity
<a href="#">ArMajorVersion</a>	1..1
<a href="#">ArMinorVersion</a>	1..1
<a href="#">ArPatchVersion</a>	1..1
<a href="#">SwMajorVersion</a>	1..1
<a href="#">SwMinorVersion</a>	1..1
<a href="#">SwPatchVersion</a>	1..1
<a href="#">ModuleId</a>	1..1
<a href="#">VendorId</a>	1..1
<a href="#">VendorApiInfix</a>	1..1
<a href="#">Release</a>	1..1

Parameter Name	ArMajorVersion
<b>Label</b>	AUTOSAR Major Version
<b>Description</b>	Major version number of AUTOSAR specification on which the appropriate implementation is based on.

<b>Multiplicity</b>	1..1
<b>Type</b>	INTEGER_LABEL
<b>Default value</b>	4
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH

<b>Parameter Name</b>	<b>ArMinorVersion</b>
<b>Label</b>	AUTOSAR Minor Version
<b>Description</b>	Minor version number of AUTOSAR specification on which the appropriate implementation is based on.
<b>Multiplicity</b>	1..1
<b>Type</b>	INTEGER_LABEL
<b>Default value</b>	2
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH

<b>Parameter Name</b>	<b>ArPatchVersion</b>
<b>Label</b>	AUTOSAR Patch Version
<b>Description</b>	Patch level version number of AUTOSAR specification on which the appropriate implementation is based on.
<b>Multiplicity</b>	1..1
<b>Type</b>	INTEGER_LABEL
<b>Default value</b>	1
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH

<b>Parameter Name</b>	<b>SwMajorVersion</b>
<b>Label</b>	Software Major Version
<b>Description</b>	Major version number of the vendor specific implementation of the module.
<b>Multiplicity</b>	1..1
<b>Type</b>	INTEGER_LABEL
<b>Default value</b>	2
<b>Configuration class</b>	<b>PublishedInformation:</b>

<b>Origin</b>	Elektrobit Automotive GmbH
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<b>Parameter Name</b>	<b>SwMinorVersion</b>	
<b>Label</b>	Software Minor Version	
<b>Description</b>	Minor version number of the vendor specific implementation of the module. The numbering is vendor specific.	
<b>Multiplicity</b>	1..1	
<b>Type</b>	INTEGER_LABEL	
<b>Default value</b>	0	
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

<b>Parameter Name</b>	<b>SwPatchVersion</b>	
<b>Label</b>	Software Patch Version	
<b>Description</b>	Patch level version number of the vendor specific implementation of the module. The numbering is vendor specific.	
<b>Multiplicity</b>	1..1	
<b>Type</b>	INTEGER_LABEL	
<b>Default value</b>	18	
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

<b>Parameter Name</b>	<b>ModuleId</b>	
<b>Label</b>	Numeric Module ID	
<b>Description</b>	Module ID of this module from Module List	
<b>Multiplicity</b>	1..1	
<b>Type</b>	INTEGER_LABEL	
<b>Default value</b>	207	
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

<b>Parameter Name</b>	<b>VendorId</b>	
<b>Label</b>	Vendor ID	
<b>Description</b>	Vendor ID of the dedicated implementation of this module according to the AUTOSAR vendor list	

<b>Multiplicity</b>	1..1
<b>Type</b>	INTEGER_LABEL
<b>Default value</b>	1
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH

<b>Parameter Name</b>	<b>VendorApilnfix</b>
<b>Multiplicity</b>	1..1
<b>Type</b>	STRING_LABEL

<b>Parameter Name</b>	<b>Release</b>
<b>Label</b>	Release Information
<b>Multiplicity</b>	1..1
<b>Type</b>	STRING_LABEL
<b>Default value</b>	
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH

#### 4.2.1.2. PublishedInformation

Parameters included	
Parameter name	Multiplicity
<a href="#">PbcfgMSupport</a>	1..1

<b>Parameter Name</b>	<b>PbcfgMSupport</b>
<b>Label</b>	PbcfgM support
<b>Description</b>	Specifies whether or not the E2E can use the PbcfgM module for post-build support.
<b>Multiplicity</b>	1..1
<b>Type</b>	BOOLEAN
<b>Default value</b>	false
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH



## 4.2.2. Application programming interface (API)

### 4.2.2.1. Type definitions

#### 4.2.2.1.1. E2E\_PCheckStatusType

<b>Purpose</b>	Status type for E2E State Machine return values.
<b>Type</b>	uint8

### 4.2.2.2. Macro constants

#### 4.2.2.2.1. E2E\_AR\_MAJOR\_VERSION

<b>Purpose</b>	AUTOSAR specification major version.
<b>Value</b>	4U

#### 4.2.2.2.2. E2E\_AR\_MINOR\_VERSION

<b>Purpose</b>	AUTOSAR specification minor version.
<b>Value</b>	2U

#### 4.2.2.2.3. E2E\_AR\_PATCH\_VERSION

<b>Purpose</b>	AUTOSAR specification patch version.
<b>Value</b>	1U

#### 4.2.2.2.4. E2E\_AR\_RELEASE\_MAJOR\_VERSION

<b>Purpose</b>	AUTOSAR release major version.
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<b>Value</b>	4U
--------------	----

#### 4.2.2.2.5. E2E\_AR\_RELEASE\_MINOR\_VERSION

<b>Purpose</b>	AUTOSAR release minor version.
<b>Value</b>	2U

#### 4.2.2.2.6. E2E\_AR\_RELEASE\_REVISION\_VERSION

<b>Purpose</b>	AUTOSAR release revision version.
<b>Value</b>	1U

#### 4.2.2.2.7. E2E\_E\_INPUTERR\_NULL

<b>Purpose</b>	At least one pointer parameter is a NULL pointer.
<b>Value</b>	0x13U

#### 4.2.2.2.8. E2E\_E\_INPUTERR\_WRONG

<b>Purpose</b>	At least one input parameter is erroneous (e.g. out of range).
<b>Value</b>	0x17U

#### 4.2.2.2.9. E2E\_E\_INTERR

<b>Purpose</b>	An internal library error has occurred.
<b>Value</b>	0x19U
<b>Description</b>	An internal library error has occurred. (e.g. error detected by program flow monitoring, violated invariant or postcondition)

#### 4.2.2.2.10. E2E\_E\_INVALID

<b>Purpose</b>	Invalid value passed to function.
<b>Value</b>	0xFFU

#### 4.2.2.2.11. E2E\_E\_OK

<b>Purpose</b>	Function completed successfully.
<b>Value</b>	0U

#### 4.2.2.2.12. E2E\_E\_WRONGSTATE

<b>Purpose</b>	Function executed in wrong state.
<b>Value</b>	0x1AU

#### 4.2.2.2.13. E2E\_MODULE\_ID

<b>Purpose</b>	AUTOSAR module identification.
<b>Value</b>	207U

#### 4.2.2.2.14. E2E\_P\_ERROR

<b>Purpose</b>	Error not related to counters occurred (e.g. wrong crc, wrong length, wrong DataID) or the return of the check function was not OK.
<b>Value</b>	0x03U
<b>Description</b>	Note: related to E2E_PCheckStatusType

#### 4.2.2.2.15. E2E\_P\_NONEWDATA

<b>Purpose</b>	No new Data is available since the last call of the check function.
<b>Value</b>	0x05U
<b>Description</b>	Note: related to E2E_PCheckStatusType

#### 4.2.2.2.16. E2E\_P\_NOTAVAILABLE

<b>Purpose</b>	No value has been received yet. This is used as the initialization value for the buffer, it is not returned by any E2E profile.
<b>Value</b>	0x04U
<b>Description</b>	Note: related to E2E_PCheckStatusType

#### 4.2.2.2.17. E2E\_P\_OK

<b>Purpose</b>	The checks of the Data in this cycle were successful (including counter check).
<b>Value</b>	0x00U
<b>Description</b>	Note: related to E2E_PCheckStatusType

#### 4.2.2.2.18. E2E\_P\_REPEATED

<b>Purpose</b>	Either no new data is available, or the new data has a repeated counter.
<b>Value</b>	0x01U
<b>Description</b>	Note: related to E2E_PCheckStatusType

#### 4.2.2.2.19. E2E\_P\_WRONGSEQUENCE

<b>Purpose</b>	The checks of the Data in this cycle were successful, with the exception of counter jump, which changed more than allowed delta.
<b>Value</b>	0x02U
<b>Description</b>	Note: related to E2E_PCheckStatusType

#### 4.2.2.2.20. E2E\_SW\_MAJOR\_VERSION

<b>Purpose</b>	AUTOSAR module major version.
<b>Value</b>	2U

#### 4.2.2.2.21. E2E\_SW\_MINOR\_VERSION

<b>Purpose</b>	AUTOSAR module minor version.
<b>Value</b>	0U

#### 4.2.2.2.22. E2E\_SW\_PATCH\_VERSION

<b>Purpose</b>	AUTOSAR module patch version.
<b>Value</b>	18U

#### 4.2.2.2.23. E2E\_VENDOR\_ID

<b>Purpose</b>	AUTOSAR vendor identification: Elektrobit Automotive GmbH.
<b>Value</b>	1U

### 4.2.2.3. Functions

#### 4.2.2.3.1. E2E\_GetVersionInfo

<b>Purpose</b>	Return the modules version information.	
<b>Synopsis</b>	<code>void <b>E2E_GetVersionInfo</b> ( Std_VersionInfoType * VersionInfo );</code>	
<b>Service ID</b>	0x14	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant	
<b>Parameters (out)</b>	VersionInfo	Pointer where to store the version information of this module
<b>Description</b>	<p>This service returns the version information of this module. The version information includes:</p> <ul style="list-style-type: none"><li>▶ Module Id</li><li>▶ Vendor Id</li><li>▶ Vendor specific version numbers</li></ul>	

## 4.2.3. Integration notes

### 4.2.3.1. Exclusive areas

Exclusive areas are not used by the E2E module.

### 4.2.3.2. Production errors

Production errors are not reported by the E2E module.

### 4.2.3.3. Memory mapping

General information about memory mapping is provided in the EB tresos AutoCore Generic documentation. Refer to the section `Memory mapping and compiler abstraction` in the `Integration notes` section for details.

The following table provides the list of sections that may be mapped for this module:

Memory section
CODE
CONST_8
CONST_16
CONST_32
CONST_UNSPECIFIED

### 4.2.3.4. Integration requirements

#### WARNING



#### Integration requirements list is not exhaustive

The following list of integration requirements helps you to integrate your product. However, this list is not exhaustive. You also require information from the user guide, release notes, and EB tresos AutoCore known issues to successfully integrate your product.

Integration requirements are not listed for the E2E module.

## 4.3. E2EP04

### 4.3.1. Configuration parameters

Containers included		
Container name	Multiplicity	Description
<a href="#">CommonPublishedInformation</a>	1..1	<b>Label:</b> Common Published Information Common container, aggregated by all modules. It contains published information about vendor and versions.

Containers included		
<a href="#">PublishedInformation</a>	1..1	<b>Label:</b> EB Published Information Additional published parameters not covered by Common-PublishedInformation container.

#### 4.3.1.1. CommonPublishedInformation

Parameters included	
Parameter name	Multiplicity
<a href="#">ArMajorVersion</a>	1..1
<a href="#">ArMinorVersion</a>	1..1
<a href="#">ArPatchVersion</a>	1..1
<a href="#">SwMajorVersion</a>	1..1
<a href="#">SwMinorVersion</a>	1..1
<a href="#">SwPatchVersion</a>	1..1
<a href="#">ModuleId</a>	1..1
<a href="#">VendorId</a>	1..1
<a href="#">VendorApilInfix</a>	1..1
<a href="#">Release</a>	1..1

Parameter Name	ArMajorVersion	
<b>Label</b>	AUTOSAR Major Version	
<b>Description</b>	Major version number of AUTOSAR specification on which the appropriate implementation is based on.	
<b>Multiplicity</b>	1..1	
<b>Type</b>	INTEGER_LABEL	
<b>Default value</b>	4	
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

Parameter Name	ArMinorVersion	
<b>Label</b>	AUTOSAR Minor Version	
<b>Description</b>	Minor version number of AUTOSAR specification on which the appropriate implementation is based on.	

<b>Multiplicity</b>	1..1
<b>Type</b>	INTEGER_LABEL
<b>Default value</b>	2
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH

<b>Parameter Name</b>	<b>ArPatchVersion</b>
<b>Label</b>	AUTOSAR Patch Version
<b>Description</b>	Patch level version number of AUTOSAR specification on which the appropriate implementation is based on.
<b>Multiplicity</b>	1..1
<b>Type</b>	INTEGER_LABEL
<b>Default value</b>	1
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH

<b>Parameter Name</b>	<b>SwMajorVersion</b>
<b>Label</b>	Software Major Version
<b>Description</b>	Major version number of the vendor specific implementation of the module.
<b>Multiplicity</b>	1..1
<b>Type</b>	INTEGER_LABEL
<b>Default value</b>	1
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH

<b>Parameter Name</b>	<b>SwMinorVersion</b>
<b>Label</b>	Software Minor Version
<b>Description</b>	Minor version number of the vendor specific implementation of the module. The numbering is vendor specific.
<b>Multiplicity</b>	1..1
<b>Type</b>	INTEGER_LABEL
<b>Default value</b>	0
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH



Parameter Name	SwPatchVersion
Label	Software Patch Version
Description	Patch level version number of the vendor specific implementation of the module. The numbering is vendor specific.
Multiplicity	1..1
Type	INTEGER_LABEL
Default value	11
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

Parameter Name	ModuleId
Label	Numeric Module ID
Description	Module ID of this module from Module List
Multiplicity	1..1
Type	INTEGER_LABEL
Default value	0
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

Parameter Name	VendorId
Label	Vendor ID
Description	Vendor ID of the dedicated implementation of this module according to the AUTOSAR vendor list
Multiplicity	1..1
Type	INTEGER_LABEL
Default value	1
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

Parameter Name	VendorApilnfix
Multiplicity	1..1
Type	STRING_LABEL

Parameter Name	Release
----------------	---------

<b>Label</b>	Release Information	
<b>Multiplicity</b>	1..1	
<b>Type</b>	STRING_LABEL	
<b>Default value</b>		
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

#### 4.3.1.2. PublishedInformation

Parameters included	
Parameter name	Multiplicity
<a href="#">PbcfgMSupport</a>	1..1

<b>Parameter Name</b>	<b>PbcfgMSupport</b>
<b>Label</b>	PbcfgM support
<b>Description</b>	Specifies whether or not the E2EP04 can use the PbcfgM module for post-build support.
<b>Multiplicity</b>	1..1
<b>Type</b>	BOOLEAN
<b>Default value</b>	false
<b>Configuration class</b>	<b>PublishedInformation:</b>
<b>Origin</b>	Elektrobit Automotive GmbH

### 4.3.2. Application programming interface (API)

#### 4.3.2.1. Type definitions

##### 4.3.2.1.1. E2E\_P04CheckStateType

<b>Purpose</b>	Definition of E2E Profile 4 receiver state type.
<b>Type</b>	struct

<b>Members</b>	E2E_P04CheckStatusType Status	Result of the verification of the Data, determined by the Check function.
	uint16 Counter	Counter of last valid received message.
<b>Description</b>	State of the sender for a Data protected with E2E Profile 4.	

#### 4.3.2.1.2. E2E\_P04CheckStatusType

<b>Purpose</b>	Definition of E2E Profile 4 receiver status type.	
<b>Type</b>	enum	
<b>Constants</b>	E2E_P04STATUS_OK	New data has been correctly received.
	E2E_P04STATUS_NONEWDATA	The Check function has been invoked but new Data is not available since the last call.
	E2E_P04STATUS_ERROR	The data has been received according to communication medium, but the CRC is incorrect.
	E2E_P04STATUS_REPEATED	New data has been correctly received, but the Counter is identical to the most recent Data
	E2E_P04STATUS_OKSOMELOST	New data has been correctly received, but some data in the sequence have been probably lost.
	E2E_P04STATUS_WRONGSEQUENCE	The new data has been correctly received, but the Counter Delta is too big (DeltaCounter > MaxDeltaCounter)
<b>Description</b>	Result of the verification of the Data in E2E Profile 4, determined by the Check function.	

#### 4.3.2.1.3. E2E\_P04ConfigType

<b>Purpose</b>	Non-modifiable configuration of the data element sent over an RTE port, for E2E Profile.	
<b>Type</b>	struct	
<b>Members</b>	uint32 DataID	A system-unique identifier of the Data.
	uint16 Offset	Bit offset of the E2E header from the beginning of the Data Array. The

		offset shall be a multiple of 8 and $0 \leq \text{Offset} \leq \text{MaxDataLength} - (12 \times 8)$ . Example: If Offset equals 8, then the high byte of the E2E Length (16 bit) is written to Byte 1, the low Byte is written to Byte 2. Additionally, Offset + size of header (96 bits) shall be $\leq \text{Length} \times 8$
	uint16 MinDataLength	Minimum length of Data in bits. The value shall be $\leq 4096 \times 8$ (4kB) and shall be $\geq 12 \times 8$
	uint16 MaxDataLength	Maximum length of data in bits. The value shall be a multiple of 8 and $\geq \text{MinDataLength}$ and $\leq 4096 \times 8$ (4kB)
	uint16 MaxDeltaCounter	Maximum allowed gap between two counter values of two consecutively received valid Data.
<b>Description</b>	The position of the counter and CRC is not configurable in Profile 4.	

#### 4.3.2.1.4. E2E\_P04ProtectStateType

<b>Purpose</b>	State of the sender for a Data protected with E2E Profile 4.	
<b>Type</b>	struct	
<b>Members</b>	uint16 Counter	Counter to be used for protecting the Data.

#### 4.3.2.2. Macro constants

##### 4.3.2.2.1. E2EP04\_AR\_RELEASE\_MAJOR\_VERSION

<b>Purpose</b>	AUTOSAR release major version.
<b>Value</b>	4U

##### 4.3.2.2.2. E2EP04\_AR\_RELEASE\_MINOR\_VERSION

<b>Purpose</b>	AUTOSAR release minor version.
<b>Value</b>	2U

#### 4.3.2.2.3. E2EP04\_AR\_RELEASE\_REVISION\_VERSION

<b>Purpose</b>	AUTOSAR release revision version.
<b>Value</b>	1U

#### 4.3.2.2.4. E2EP04\_SW\_MAJOR\_VERSION

<b>Purpose</b>	AUTOSAR module major version.
<b>Value</b>	1U

#### 4.3.2.2.5. E2EP04\_SW\_MINOR\_VERSION

<b>Purpose</b>	AUTOSAR module minor version.
<b>Value</b>	0U

#### 4.3.2.2.6. E2EP04\_SW\_PATCH\_VERSION

<b>Purpose</b>	AUTOSAR module patch version.
<b>Value</b>	11U

#### 4.3.2.2.7. E2EP04\_VENDOR\_ID

<b>Purpose</b>	AUTOSAR vendor identification: Elektrobit Automotive GmbH.
<b>Value</b>	1U

### 4.3.2.3. Functions

#### 4.3.2.3.1. E2E\_P04Check

<b>Purpose</b>	Check the received Data using the E2E Profile 4.
<b>Synopsis</b>	<pre>Std_ReturnType <b>E2E_P04Check</b> ( const E2E_P04ConfigType * Config- Ptr , E2E_P04CheckStateType * StatePtr , const uint8 * DataPtr  , uint16 Length );</pre>
<b>Service ID</b>	0x23

<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant for different communication data / states	
<b>Parameters (in)</b>	ConfigPtr	Pointer to static configuration.
	DataPtr	Pointer to received Data.
	Length	Length of the Data.
<b>Parameters (in,out)</b>	StatePtr	Pointer to port/data communication state.
<b>Return Value</b>	Function execution success status	
	E2E_E_INPUTERR_NULL	At least one pointer parameter is a NULL pointer.
	E2E_E_INPUTERR_WRONG	At least one input parameter is erroneous.
	E2E_E_OK	Function completed successfully.
<b>Description</b>	Checks the Data received using the E2E Profile 4. This includes CRC calculation, handling of Sequence Counter and Data ID.	

#### 4.3.2.3.2. E2E\_P04CheckInit

<b>Purpose</b>	Initializes the check state.	
<b>Synopsis</b>	Std_ReturnType <b>E2E_P04CheckInit</b> ( E2E_P04CheckStateType * StatePtr );	
<b>Service ID</b>	0x24	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant for different states	
<b>Parameters (out)</b>	StatePtr	Pointer to port/data communication state.
<b>Return Value</b>	Function execution success status	
	E2E_E_INPUTERR_NULL	NULL pointer passed.
	E2E_E_OK	Function completed successfully.
<b>Description</b>	Initializes the state structure by setting the Counter to 0xFFFF and the State to E2E_P04STATUS_ERROR.	

#### 4.3.2.3.3. E2E\_P04MapStatusToSM

<b>Purpose</b>	Maps the check status of Profile 4 to a generic check status.
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<b>Synopsis</b>	E2E_PCheckStatusType <b>E2E_P04MapStatusToSM</b> ( Std_ReturnType CheckReturn , E2E_P04CheckStatusType Status );	
<b>Service ID</b>	0x25	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant for different status types	
<b>Parameters (in)</b>	CheckReturn	Return value of the E2E_P04Check function.
	Status	Status determined by E2E_P04Check function.
<b>Return Value</b>	Profile-independent status of the reception on one single Data in one cycle.	
	E2E_P_OK	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_OK or E2E_P04STATUS_OKSOMELOST.
	E2E_P_ERROR	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_ERROR or CheckReturn is different than E2E_E_OK or Status is undefined.
	E2E_P_REPEATED	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_REPEATED
	E2E_P_NONEWDATA	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_NONEWDATA.
	E2E_P_WRONGSEQUENCE	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_WRONGSEQUENCE.
<b>Description</b>	The function maps the check status of Profile 4 to a generic check status, which can be used by E2E state machine check function. The E2E Profile 4 delivers a more fine-granular status, but this is not relevant for the E2E state machine.	

#### 4.3.2.3.4. E2E\_P04Protect

<b>Purpose</b>	Protects the array/buffer to be transmitted using the E2E Profile 4.
<b>Synopsis</b>	Std_ReturnType <b>E2E_P04Protect</b> ( const E2E_P04ConfigType * ConfigPtr , E2E_P04ProtectStateType * StatePtr , uint8 * DataPtr , uint16 Length );
<b>Service ID</b>	0x21
<b>Sync/Async</b>	Synchronous
<b>Reentrancy</b>	Reentrant for different communication data / states

<b>Parameters (in)</b>	ConfigPtr	Pointer to static configuration.
	Length	Length of the Data.
<b>Parameters (in,out)</b>	StatePtr	Pointer to port/data communication state.
	DataPtr	Pointer to Data to be protected.
<b>Return Value</b>	Function execution success status	
	E2E_E_INPUTERR_NULL	At least one pointer parameter is a NULL pointer.
	E2E_E_INPUTERR_WRONG	At least one input parameter is erroneous.
	E2E_E_OK	Function completed successfully.
<b>Description</b>	Protects the array/buffer to be transmitted using the E2E Profile 4. This includes checksum calculation, handling of Sequence counter and Data ID.	

#### 4.3.2.3.5. E2E\_P04ProtectInit

<b>Purpose</b>	Initializes the protection state.	
<b>Synopsis</b>	Std_ReturnType <b>E2E_P04ProtectInit</b> ( E2E_P04ProtectStateType * StatePtr );	
<b>Service ID</b>	0x22	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant for different states	
<b>Parameters (out)</b>	StatePtr	Pointer to port/data communication state.
<b>Return Value</b>	Function execution success status	
	E2E_E_INPUTERR_NULL	NULL pointer passed.
	E2E_E_OK	Function completed successfully.
<b>Description</b>	Initializes the state structure by setting the Counter to 0.	

### 4.3.3. Integration notes

#### 4.3.3.1. Exclusive areas

Exclusive areas are not used by the E2EP04 module.



### 4.3.3.2. Production errors

Production errors are not reported by the E2EP04 module.

### 4.3.3.3. Memory mapping

General information about memory mapping is provided in the EB tresos AutoCore Generic documentation. Refer to the section `Memory mapping and compiler abstraction` in the `Integration notes` section for details.

The following table provides the list of sections that may be mapped for this module:

Memory section
CODE

### 4.3.3.4. Integration requirements

**WARNING**



**Integration requirements list is not exhaustive**

The following list of integration requirements helps you to integrate your product. However, this list is not exhaustive. You also require information from the user guide, release notes, and EB tresos AutoCore known issues to successfully integrate your product.

Integration requirements are not listed for the E2EP04 module.

## 4.4. SCrc

### 4.4.1. Configuration parameters

Containers included		
Container name	Multiplicity	Description
<a href="#">CommonPublishedInformation</a>	1..1	<b>Label:</b> Common Published Information

Containers included		
		Common container, aggregated by all modules. It contains published information about vendor and versions.
<a href="#">PublishedInformation</a>	1..1	<b>Label:</b> EB Published Information Additional published parameters not covered by Common-PublishedInformation container.
<a href="#">SCrcPublishedInformation</a>	1..1	Additional published parameters not covered by Common-PublishedInformation container.  Note that these parameters do not have any configuration class setting, since they are published information.

Parameters included	
Parameter name	Multiplicity
<a href="#">IMPLEMENTATION_CONFIG_VARIANT</a>	1..1

Parameter Name	IMPLEMENTATION_CONFIG_VARIANT
Label	Config Variant
Multiplicity	1..1
Type	ENUMERATION
Default value	VariantPreCompile
Range	VariantPreCompile

#### 4.4.1.1. CommonPublishedInformation

Parameters included	
Parameter name	Multiplicity
<a href="#">ArMajorVersion</a>	1..1
<a href="#">ArMinorVersion</a>	1..1
<a href="#">ArPatchVersion</a>	1..1
<a href="#">SwMajorVersion</a>	1..1
<a href="#">SwMinorVersion</a>	1..1
<a href="#">SwPatchVersion</a>	1..1
<a href="#">ModuleId</a>	1..1
<a href="#">VendorId</a>	1..1

Parameters included	
<a href="#">Release</a>	1..1

Parameter Name	ArMajorVersion	
Label	AUTOSAR Major Version	
Description	Major version number of AUTOSAR specification on which the appropriate implementation is based on.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	ArMinorVersion	
Label	AUTOSAR Minor Version	
Description	Minor version number of AUTOSAR specification on which the appropriate implementation is based on.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	ArPatchVersion	
Label	AUTOSAR Patch Version	
Description	Patch level version number of AUTOSAR specification on which the appropriate implementation is based on.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	SwMajorVersion	
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<b>Label</b>	Software Major Version	
<b>Description</b>	Major version number of the vendor specific implementation of the module.	
<b>Multiplicity</b>	1..1	
<b>Type</b>	INTEGER_LABEL	
<b>Default value</b>	2	
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

<b>Parameter Name</b>	<b>SwMinorVersion</b>	
<b>Label</b>	Software Minor Version	
<b>Description</b>	Minor version number of the vendor specific implementation of the module. The numbering is vendor specific.	
<b>Multiplicity</b>	1..1	
<b>Type</b>	INTEGER_LABEL	
<b>Default value</b>	0	
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

<b>Parameter Name</b>	<b>SwPatchVersion</b>	
<b>Label</b>	Software Patch Version	
<b>Description</b>	Patch level version number of the vendor specific implementation of the module. The numbering is vendor specific.	
<b>Multiplicity</b>	1..1	
<b>Type</b>	INTEGER_LABEL	
<b>Default value</b>	12	
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

<b>Parameter Name</b>	<b>ModuleId</b>	
<b>Label</b>	Numeric Module ID	
<b>Description</b>	Module ID of this module from Module List	
<b>Multiplicity</b>	1..1	
<b>Type</b>	INTEGER_LABEL	
<b>Default value</b>	0	

<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

<b>Parameter Name</b>	<b>VendorId</b>	
<b>Label</b>	Vendor ID	
<b>Description</b>	Vendor ID of the dedicated implementation of this module according to the AUTOSAR vendor list	
<b>Multiplicity</b>	1..1	
<b>Type</b>	INTEGER_LABEL	
<b>Default value</b>	1	
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

<b>Parameter Name</b>	<b>Release</b>	
<b>Label</b>	Release Information	
<b>Multiplicity</b>	1..1	
<b>Type</b>	STRING_LABEL	
<b>Default value</b>		
<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

#### 4.4.1.2. PublishedInformation

Parameters included	
Parameter name	Multiplicity
<a href="#">PbcfgMSupport</a>	1..1

<b>Parameter Name</b>	<b>PbcfgMSupport</b>
<b>Label</b>	PbcfgM support
<b>Description</b>	Specifies whether or not the SCrc can use the PbcfgM module for post-build support.
<b>Multiplicity</b>	1..1
<b>Type</b>	BOOLEAN
<b>Default value</b>	false

<b>Configuration class</b>	<b>PublishedInformation:</b>	
<b>Origin</b>	Elektrobit Automotive GmbH	

#### 4.4.1.3. SCrcPublishedInformation

### 4.4.2. Application programming interface (API)

#### 4.4.2.1. Macro constants

##### 4.4.2.1.1. SCRC\_FUNCENABLED\_SCRC\_CRC16

<b>Purpose</b>	Defines whether or not SCrc_CalculateCRC16 shall map to <a href="#">SCrc_CalculateCRC16()</a> of this SCrc module (STD_ON) or shall map to an external function Crc_CalculateCRC16() declared in Crc.h (STD_OFF).
<b>Value</b>	STD_ON

##### 4.4.2.1.2. SCRC\_FUNCENABLED\_SCRC\_CRC32P4

<b>Purpose</b>	Defines whether or not SCrc_CalculateCRC32P4 shall map to <a href="#">SCrc_CalculateCRC32P4()</a> of this SCrc module (STD_ON) or shall map to an external function Crc_CalculateCRC32P4() declared in Crc.h (STD_OFF).
<b>Value</b>	STD_ON

##### 4.4.2.1.3. SCRC\_FUNCENABLED\_SCRC\_CRC8

<b>Purpose</b>	Defines whether or not SCrc_CalculateCRC8 shall map to <a href="#">SCrc_CalculateCRC8()</a> of this SCrc module (STD_ON) or shall map to an external function Crc_CalculateCRC8() declared in Crc.h (STD_OFF).
<b>Value</b>	STD_ON

#### 4.4.2.1.4. SCRC\_FUNCENABLED\_SCRC\_CRC8H2F

<b>Purpose</b>	Defines whether or not SCrc_CalculateCRC8H2F shall map to <a href="#">SCrc_CalculateCRC8H2F()</a> of this SCrc module (STD_ON) or shall map to an external function Crc_CalculateCRC8H2F() declared in Crc.h (STD_OFF).
<b>Value</b>	STD_ON

#### 4.4.2.1.5. SCRC\_SW\_MAJOR\_VERSION

<b>Purpose</b>	AUTOSAR module major version.
<b>Value</b>	2U

#### 4.4.2.1.6. SCRC\_SW\_MINOR\_VERSION

<b>Purpose</b>	AUTOSAR module minor version.
<b>Value</b>	0U

#### 4.4.2.1.7. SCRC\_SW\_PATCH\_VERSION

<b>Purpose</b>	AUTOSAR module patch version.
<b>Value</b>	12U

#### 4.4.2.1.8. SCRC\_VENDOR\_ID

<b>Purpose</b>	AUTOSAR vendor identification: Elektrobit Automotive GmbH.
<b>Value</b>	1U

### 4.4.2.2. Functions

#### 4.4.2.2.1. SCrc\_CalculateCRC16

<b>Purpose</b>	Calculation of CRC16.
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<b>Synopsis</b>	<pre>uint16 SCrc_CalculateCRC16 ( const uint8 * SCrc_DataPtr , uint32 SCrc_Length , uint16 SCrc_StartValue16 , boolean SCrc_IsFirstCall );</pre>	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant	
<b>Parameters (in)</b>	SCrc_DataPtr	Valid pointer to start address of data block
	SCrc_Length	Length of data block in bytes
	SCrc_StartValue16	Initial Value
	SCrc_IsFirstCall	TRUE: First call in a sequence or individual CRC calculation; start from initial value, ignore Crc_StartValue16. FALSE: Subsequent call in a call sequence; Crc_StartValue16 is interpreted to be the return value of the previous function call.
<b>Return Value</b>	calculated CRC16 value	
<b>Description</b>	This function performs the calculation of a 16-bit CRC value over the memory block referenced by SCrc_DataPtr of byte length SCrc_Length.	

#### 4.4.2.2.2. SCrc\_CalculateCRC32P4

<b>Purpose</b>	Calculation of CRC32P4.	
<b>Synopsis</b>	<pre>uint32 SCrc_CalculateCRC32P4 ( const uint8 * SCrc_DataPtr , uint32 SCrc_Length , uint32 SCrc_StartValue32P4 , boolean SCrc_IsFirstCall );</pre>	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant	
<b>Parameters (in)</b>	SCrc_DataPtr	Valid pointer to start address of data block
	SCrc_Length	Length of data block in bytes
	SCrc_StartValue32P4	Initial Value
	SCrc_IsFirstCall	TRUE: First call in a sequence or individual CRC calculation; start from initial value, ignore Crc_StartValue8. FALSE: Subsequent call in a call sequence; Crc_StartValue32P4 is interpreted to be the return value of the previous function call.
<b>Return Value</b>	calculated CRC32 value	



<b>Description</b>	This function performs the calculation of a 32-bit CRC value for Ethernet over the memory block referenced by SCrc_DataPtr of byte length SCrc_Length.
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#### 4.4.2.2.3. SCrc\_CalculateCRC8

<b>Purpose</b>	Calculation of CRC8.	
<b>Synopsis</b>	<pre>uint8 SCrc_CalculateCRC8 ( const uint8 * SCrc_DataPtr , uint32 SCrc_Length , uint8 SCrc_StartValue8 , boolean SCrc_IsFirstCall );</pre>	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant	
<b>Parameters (in)</b>	SCrc_DataPtr	Valid pointer to start address of data block
	SCrc_Length	Length of data block in bytes
	SCrc_StartValue8	Initial Value
	SCrc_IsFirstCall	TRUE: First call in a sequence or individual CRC calculation; start from initial value, ignore Crc_StartValue8. FALSE: Subsequent call in a call sequence; Crc_StartValue8 is interpreted to be the return value of the previous function call.
<b>Return Value</b>	calculated CRC8 value	
<b>Description</b>	This function performs the calculation of a 8-bit SAE J1850 CRC value over the memory block referenced by SCrc_DataPtr of byte length SCrc_Length.	

#### 4.4.2.2.4. SCrc\_CalculateCRC8H2F

<b>Purpose</b>	Calculation of CRC8 with the Polynomial 0x2F.	
<b>Synopsis</b>	<pre>uint8 SCrc_CalculateCRC8H2F ( const uint8 * SCrc_DataPtr , uint32 SCrc_Length , uint8 SCrc_StartValue8H2F , boolean SCrc_ IsFirstCall );</pre>	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant	
<b>Parameters (in)</b>	SCrc_DataPtr	Valid pointer to start address of data block
	SCrc_Length	Length of data block in bytes

	SCrc_StartValue8	Initial Value
	SCrc_IsFirstCall	TRUE: First call in a sequence or individual CRC calculation; start from initial value, ignore Crc_StartValue8. FALSE: Subsequent call in a call sequence; Crc_StartValue8 is interpreted to be the return value of the previous function call.
<b>Return Value</b>	calculated CRC8 value	
<b>Description</b>	This function performs the calculation of a 8-bit CRC value with the Polynomial 0x2F over the memory block referenced by SCrc_DataPtr of byte length SCrc_Length.	

## 4.4.3. Integration notes

### 4.4.3.1. Exclusive areas

Exclusive areas are not used by the `SCrc` module.

### 4.4.3.2. Production errors

Production errors are not reported by the `SCrc` module.

### 4.4.3.3. Memory mapping

General information about memory mapping is provided in the EB tresos AutoCore Generic documentation. Refer to the section `Memory mapping and compiler abstraction` in the `Integration notes` section for details.

The following table provides the list of sections that may be mapped for this module:

Memory section
CODE
CONST_8
CONST_16
CONST_32

#### 4.4.3.4. Integration requirements

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**WARNING****Integration requirements list is not exhaustive**

The following list of integration requirements helps you to integrate your product. However, this list is not exhaustive. You also require information from the user guide, release notes, and EB tresos AutoCore known issues to successfully integrate your product.

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Integration requirements are not listed for the SCrc module.

## 5. Bibliography

### Bibliography

- [1] *AUTOSAR Specification of SW-C End-to-End Communication Protection Library*, Issue AUTOSAR 4.2.1, Publisher: AUTOSAR
- [2] *AUTOSAR Specification of Module E2E Transformer*, Issue AUTOSAR 4.2.1, Publisher: AUTOSAR