SW Requirements Specification

Customer

Project

**Revision History**

| **Version** | **Date** | **Change Description / Reason** | **Author** |
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# Introduction

The software requirements specification applies to project <project name> and is binding for all phases of the project.

## Definitions, Glossary

If and when required, own project-specific abbreviations and definitions

## References

Complete list of all documents which are involved or to which reference is made including the date (e.g. customer standards, specifications of system components affected etc.)

# General Description

## Product Functions

Describe the main functions (no details) of the software.

Example

Software is responsible for controlling the interior lighting and the sunroof with squeeze protection.

### Variant 1

If variants exist, describe the first variant here. What are the extra features of the variant, what features does it not have. How the variant is coded. If variants not exist, leave the comment “NA”.

Example

Name: Global A, Code: 4008

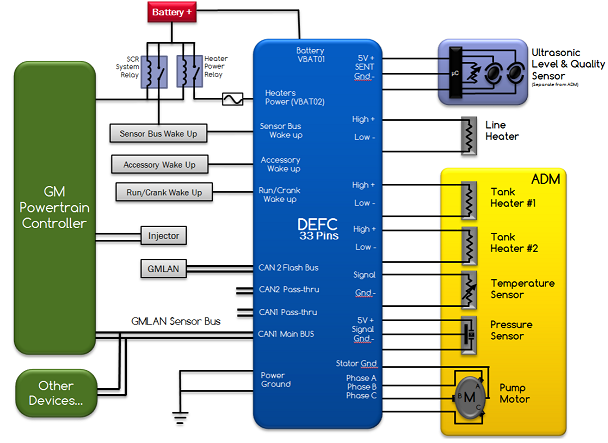
### Variant n

If variants exist, describe the n-th variant here. What are the extra features of the variant, what features does it not have. How the variant is coded.

## Product Environment

Describe the interfaces with the environment. The interfaces which need to be described are listed in the following sub-sections.

Example



## Restrictions

Briefly describe the restrictions which restrict the analyst’s and/or designer’s freedom. Details will be defined in this document at a later point. (Any restriction has to be linked to the system level. If a restriction is not linkable to system level, the system architect and the system analyst should be informed to implement a related requirement on system level.)

Restrictions which can be defined include:

* Legal conditions
* Hardware-related restrictions
* Interfaces with other (sub-)systems
* Reliability requirements
* Safety requirements

## Assumptions and Dependencies

Describe the factors which influence the requirements. This doesn’t mean the restrictions mentioned above, but e.g. the requirement that a certain operating system be used. If that operating system is not available or a different operating system is chosen, then this paragraph needs to be changed accordingly.

# Detailed Requirements

## External Interfaces

### User Interface

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

### Hardware Interface

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

### Software Interface

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

### Communication Interface

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

### Diagnostic Interface

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

#### Interface Name

* Purpose
* Source of an input or target of an output
* Range of validity, accuracy and/or tolerance
* Measuring units
* Timing
* Relationships with other inputs/outputs
* Data formats
* Command formats

## Functional Requirements

### Function 1

Very detailed descriptions of the requirements. Where possible supported by diagrams, such as data flow diagrams, statecharts, timing diagrams etc.

If no diagrams are used, the requirements may be described as shown below:

* Start conditions (e.g. TL-30 is true and Door\_RV is open)
* Start conditions are usually AND linked
* Functional description
* Describe what is to happen if the start conditions are true. The function is executed until the termination condition is true.
* If a new function needs to be started due to the termination conditions, then that process needs to be described in a new paragraph in which the termination conditions are the start conditions.
* Termination conditions (e.g. Door\_RV is closed or TL-30 is no longer true)
* Termination conditions are usually OR linked

### Function 2

### Function n

## Impact on operating environment

If impacts such as dependencies between SW requirements and the "environment" (OS, system components, etc.) need new requirements, then these are described here.

Impact examples:

- Polling in a functions should have a higher frequency (e.g. 2 µs) than the CPU cycle time

- Function should send a signal via external interface (e.g. CAN) but interface does not exist (e.g. LIN only)

## Data Dictionary

All data used in the process are described from here. State the data in alphabetical order.

If data dictionary is not described in here, please create other file. And add link of file in here.

### Data Element Name

Description:

Units/format:

Accuracy:

Range:

### Data Element Name

Description:

Units/format:

Accuracy:

Range:

## Non-functional Requirements

### Standards

Describe which standards have what effect on the functional requirements.

### Operating System

If the operating system chosen has any influence on the implementation of the requirements, describe it here.

### Quality Features

Describe the effects of the product related quality features defined on the requirements. For more information on product related quality features see SW QA Plan. If one or several of the quality features listed below have no above-average importance, then the appropriate section remains empty.

#### Safety

If certain design measures need to be made to achieve a certain safety level, they may be described here.

#### Robustness

If the software needs to be especially robust, then describe here how this is achieved.

#### Storage Efficiency

If storage space is scarce, then document here how a minimum of storage space can be used.

Example

ECU shall be designed to have at least 30% of memory as spare for future expansion.

#### Execution Efficiency

State here how the execution efficiency can be enhanced if the system is time-critical.

Example

ECU shall be designed to have at least 20% of its throughput as spare.

#### Maintainability

State how maintainability can be improved.

#### Testability

If particular store is set by testability, then describe the special measures which are necessary to ensure a high degree of testability.

#### Portability

Describe the requirements to obtain a high degree of portability of the system.

#### Reusability

If reusability is a special issue, the necessary requirements may be described here.

## Operation Modes

If the system knows different operation modes, then their details are described here. Additionally, it needs to be described under which conditions the operation mode is changed.

The following sub-paragraphs give an overview of possible operation modes. Not all of the operation modes must necessarily occur in the software; additionally, other operation modes are possible.

### Application

Example (or similar diagram)



### Start-up

See chapter 3.6.1

### Local Operation

See chapter 3.6.1

### Mains Operation

See chapter 3.6.1

### Emergency Run

See chapter 3.6.1

### Shut-down

See chapter 3.6.1

### Other Operation Modes

See chapter 3.6.1

## Reset Detection

### Detection of Unexpected Resets

### Watchdog Reset

### Other Reset Detection

E.g. detection of TL30 live

## Safety Functions

### Watchdog

### SW Trouble-shooting

### Other Safety Functions

## Operating Voltage Monitoring

### Range Thresholds

### States/Ranges

### Switching Off the Function

## Diagnosis

### Self-diagnosis

#### RAM Check

#### Flash ROM Check

#### EEPROM Check

#### Watchdog Check

#### Communication Timeout Monitoring

### Customer Diagnosis

### System Diagnosis

## CAN Interface

### References

### Restoration of CAN Signals After Power-up

### Initialisation of CAN Signals After Power-up

## CAN Handling

### Bus-off Behaviour

### Timeout Behaviour

## Other Bus Interfaces

### References

### Restoration of Signals After Power-up

### Initialisation of Signals After Power-up

## NV Memory/ EEPROM

### Data Backup Strategies

### Application of Data Backup/Retrieval

### Other