MiraTherm Radiator Thermostat Software Specification

Requirement Specification for a Master Project

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Change Log

Table 1: Document Change Log

№	Date	Version	Changed Chapters	Change Type	Editor
1	28.10.2025	1.0	All	Initial version	A. Menzel (AM)

Change testtext

Add test

Test note

Test highlight

[AM 1] v1.0: Example change

[AM 2] v1.0: Example addition

[AM 3] v1.0: Example comment

[AM 4] v1.0: Example highlight

1 Introduction

1.1 Document Purpose

This document describes requirements specification for software of a Micro Controller Unit (MCU) based radiator thermostat. This software should implement basic consumer functions and will be used as a base for research, development and production of smart heating controllers or thermostats.

1.2 Project Context

The master project will be realized as part of a bigger interdisciplinary development named “MiraTherm Radiator Thermostat”, which includes the following areas:

- **Mechanics**: Development of the thermostat’s power transmission mechanism for proper function with commonly used radiator valves, followed by the design of an enclosure.
- **Control algorithms**: Engineering of control algorithms to be used by the thermostat.
- **Electronics**: Development of the thermostat’s Printed Circuit Board (PCB) and its integration with mechanical components.
- **Software**: The subject of this work, development of the thermostat’s software and its integration with PCB components.

2 Requirements

2.1 Functional Requirements

REQ 1:

REQ 2:

2.2 Non-Functional Requirements

REQ 3:

REQ 4:

3 Time plan

The master project will presumably have the duration of 13 Calendar Weeks (CWs), which are divided into:

- CWs 44-45: Software requirements analysis.
- CW 46: Software architecture design.
- CW 47: Design of software interfaces.
- CW 48: Implementation and tests of software drivers.
- CWs 49-51: Implementation and tests of program logic.
- CWs 52-02: Paper writing.
- CWs 03-04: Final review and submission of the paper.

Each calendar week will approximately consist of $\frac{150\text{h}}{13} \approx 11.5$ hours of work.

4 Concept

4.1 Solution approach

4.2 Hardware requirements

To ensure a certain degree of independence from the PCB design, the software will be developed using a development hardware set, that resembles the final PCB in terms of components and interfaces.

4.2.1 Hardware block diagram

4.2.2 Required equipment

- **P-NUCLEO-WB55** - MCU development board with Matter standard support
- **STLINK V3 or V2** - debug probe
- **eQ-3 eqiva Model N** - Radiator thermostat with a C300 3V motor and gear box for disassembly (available)
- **DRV8833** - Motor driver module
- **1.3” OLED Display incl. SH1106** - Display with an embedded driver
- **KY-040** - Rotary encoder
- **Buttons**
- **Connecting wires**
- **Breadboard(s)**

List of Abbreviations

CW	Calendar Week
MCU	Micro Controller Unit
PCB	Printed Circuit Board

