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SIGNATURES

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Revision History

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Rev.** |  | **Date** |  | **Initials** |  | **Description** |
| 0.1 |  | 17-Oct-2018 |  | KW |  | Initial Creation from DYONICS 25 |
| 0.2 |  | 23-Jan-2019 |  | DAT |  | Updated to match DYONICS POWER II Software Architecture Design Chart Rev 0.2 |
| 0.3 |  | 16-Apr-2019 |  | DAT |  | Replace Connected Network with INTELLIO Link  Add Serial Number storage |
| A |  | 26-Sep-2019 |  | DAT |  | Updated to Revision A |
| B |  | 19-Jan-2020 |  | DAT |  | Expanded references to existing Software Upgrade. Add reference to Software Architecture Design Chart |

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1. **Overview**

The System Controller shall be a primary element in an arthroscopic powered resection design that is responsible for controlling two low voltage DC motors. The System Controller shall communicate control and parametric data bi-directionally with a Motor Controller. Using a set of System Interfaces a Controlling Application shall provide a user with graphical status and touch screen control over the motor operation. It shall also optionally provide status to a DYONICS II System and status signals to and control signals from an INTELLIO Link control system.

1. **Scope**

* The System Controller
* The Motor Controller
* Software Upgrade

1. **Definitions**

LCD – Liquid Crystal Display

USB – Universal Serial Bus

1. **References**

15008082 – DYONICS POWER II Software Architecture Design Chart

15000696 – DYONICS POWER II System Controller Software Design Specification

15000702 – DYONICS POWER II Motor Controller Software Design Specification

16000043 – DYONICS POWER II Design Failure Mode Effect Analysis

1. **Architecture**

The DYONICS POWER II software architecture is composed of two discrete components:

• The System Controller software

• The Motor Controller software

The System Controller is responsible for displaying data, receiving input from the touch panel, communicating with external data ports, communicating with the Motor Controller, overall control of the GUI based application (Display and Touch Panel), overall mode of Handpiece operation and the facility to allow field software updates to the System Controller and Motor Controller software. The System Controller software is written in C/C++ and assembly programming languages, compiled to binary form using Microsoft Embedded Visual C++ 4.0 and Platform Builder for Microsoft Windows CE 5.0, and run on an ATMEL AT91SAM9263 ARM Processor under the Microsoft Windows CE © 5.0 operating system.

The Motor Controller is responsible for controlling Handpiece motor speed and receiving commands from the Wired Footswitch. The Motor Controller is written in C/C++ and assembly programming languages, compiled to binary form using the Freescale Code Warrior for DSC5800E Compiler and run as a single application (no operating system) on a Freescale 56F8357 microcontroller.

* 1. **Inter Controller Interface**

The Inter Controller interface uses a parallel bus to pass status, configuration and control data between the System Controller and the Motor Controller. The System Controllers sends read and write commands to the Motor Controller to configure, inquire about and control the Motor Controller.

* 1. **System Controller Software Interfaces**
     1. **LCD Touch Screen**
        1. **Display**

The Display Interface uses the Adeneo Embedded AT91SAM9263\_LCDC display driver. The driver provides an 800x480 pixel color LCD display and allows use of Windows CE graphic functions for use by the Controlling Application.

* + - 1. **Touch Screen**

The Touch Screen Interface uses the Adeneo Embedded AT91SAM9263 touch screen driver. The driver provides the frame work with positional data for the Controlling Application button control.

* + 1. **Serial Interfaces**
       1. **Dyonics Power II Interface**

The System Controller supports an RS 232 serial interface to the Dyonics 25 Fluid Management System to support Pump/Shaver communication.

* + - 1. **INTELLIO Link Interface**

The System Controller supports an RS 232 serial interface to the INTELLIO Link to support remote control from the INTELLIO Link.

* + 1. **Flash Drive Interface**

The Flash Drive Interface uses the Adeneo Embedded AT91SAM9263 USB driver to provide USB Flash drive support by Windows CE. The Flash Drive Interface supports the reading of up to 2 USB Flash Drive simultaneously.

* 1. **Motor Controller Software Interfaces**
     1. **Wired Footswitch**

The Motor Controller software supports the reception of commands from a Wired Footswitch connected to the front panel of the DYONICS POWER II.

* + 1. **Handpiece A**

The Motor Controller software supports Handpiece A control via a positional controlled brushless motor interface and Hall sensor monitoring.

* + 1. **Handpiece B**

The Motor Controller software supports Handpiece B control via a positional controlled brushless motor interface and Hall sensor monitoring.

* + 1. **Accessories Interface**

The Motor Controller software supports an RS 485 Accessories Interface for control and software upgrade of compatible handpieces and footswitches.

* 1. **Software Upgrade**

The Software Upgrade provides the ability to field upgrade the System Controller software, Motor Controller software, Footswitch software, and Handpiece software via a flash drive inserted into either external USB port. Software Upgrade of the System Controller software is performed by the System controller retrieving the software update from the flash drive and storing it to local memory. The System Controller updates the Motor Controller via the Inter Controller Interface. The System Controller updates the Handpiece and Wired Footswitch Software via the Inter Controller Interface and Accessories Interface. Software Upgrade also provides the ability to enter a devices serial number for storing it to local memory.

* 1. **Failure Modes**

Failure modes and effects of the DYONICS POWER II that relate to the software architecture and the hardware interfaces are covered by the DYONICS POWER II DFMEA document, (SAP # 16000043).

1. **Software Architecture Design Chart**

A Software Architecture Design Chart is a depiction of the relationships among the major functional units in the Software Device, including relationships to hardware and to data flows and is included in DII Software Architecture Design Chart (SAP # 15008082).