Project	VIBRO CONTROL BOARD
Title	**FUNCTIONAL HARDWARE SPECIFICATION**
Doc. Id.	ASMR&D039
Revision	02
Issue date	18 March 2020
Author	Maurizio Bonesi, Marco Toschi
Approver	Marco Toschi

The documentation is © Sesotec ASM S.r.l., which holds all the rights of reproduction, disclosure and any other rights identified by current legislation on copyright. Assigned, copied, distributed or reproduced, nor quoted, summarized, or modified, even separated, without the explicit consent of Sesotec ASM S.r.l.

REVISION HISTORY

Rev.	Date	Paragraph	Description
01	31 January 2020		First issue
02	18 February 2020		"Release" column has been removed from every table
		§4.2.2	Updated
		§6.1	F23, F24 updated

INDEX

© Sesotec ASM S.r.l. – Company Confidential

1 INTRODUCTION

This document was generated under the authority of the Sesotec ASM S.r.l. company, for the purpose of developing the Vibro Control Board.

1.1 Reference Documents

Document Code	Document Title

1.2 Reference Standards

Document Code	Document Title
IEC 60529-2004	Degrees of Protection Provided by Enclosures (IP Code)
Directive 2004/108/EC	Electromagnetic compatibility
IEC 61000-6-3:2006	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

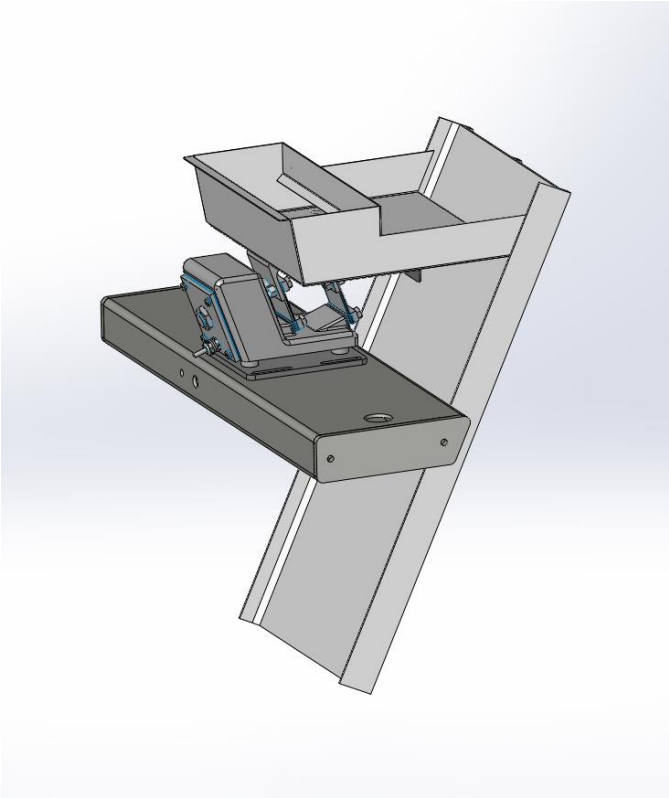
© Sesotec ASM S.r.l. – Company Confidential

2 OVERVIEW

The system consists on an electronic board that will be used to drive an external vibrating device.

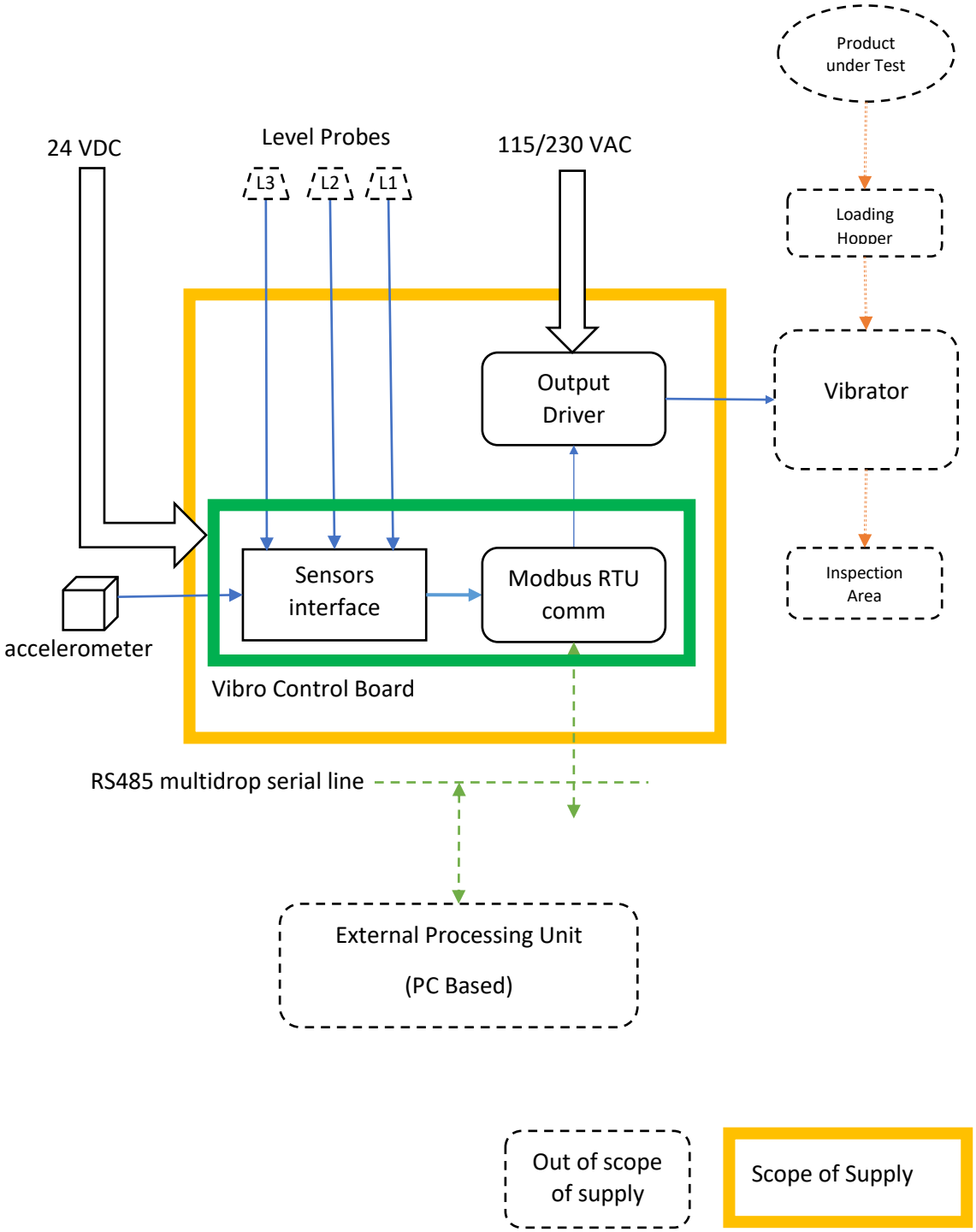
2.1 Scope and Key Objectives

The system will provide proper current amplitude values to achieve a desired product flow rate on the tray connected to the vibrating device.



© Sesotec ASM S.r.l. – Company Confidential

2.2 Functional Block Diagram



3 FUNCTIONS

Code	Function
F01	**Product Flow Adjustment** The system will regulate the product flow out of the tray of n. 1 vibrator with the following specifications: • Voltage 115/230 V AC; • Current up to 1 A; • Frequency: from 50/60 Hz. Amplitude of system voltage output will be according to grid input voltage: no hardware power conversion stage is needed.

3.1 Working Mode

Code	Function
F26	**Frequency Control** The system will allow the user to set the frequency between: • a minimum value of 40 Hz • a maximum value of 240 Hz.
F05	**Flow Control** The system will allow the user to set the flow between: • a minimum value of 0 (no product flows out); • a maximum value of 255 (product flows out at full speed).

© Sesotec ASM S.r.l. – Company Confidential

3.2 BIST

Code	Function
F12	**Automated Testing** The system will have a BIST system to improve reliability and fault recovery, that will be executed: • During runtime.

3.3 Alarms

Code	Function
F13	**Alarms** The system will manage the following alarms via an internal management system and reporting strategy: • Power fault; • Feeder accelerometer error; • Faulty feeder; • Level probes fault: odd configurations of three-probes setups will be detected (e.g.: if the rightmost signal is the machine infeed one, configurations like 101, 100, 110 will be treated as probes system failures).

4 INTERFACES

4.1 Interface with Other Systems

Code	Function
F14	**Serial Port** The system will be equipped with n. 2 RS485 terminal blocks for daisy-chain connections and configuration for termination resistor on one port.
F27	**Accelerometer** The system will allow connection for n. 1 accelerometer with the following interfaces: • 4-20mA with terminal blocks; • RS485 port with terminal blocks and termination resistor. The interface ports are mutually exclusive.
F15	**Level Probes** The system will be equipped with a terminal block to connect with n. 3 sensors: • L1, L2, L3; via dry contact interface.

4.2 Interface Protocol

Code	Function
F17	**Modbus RTU** Communication protocol will be based on Modbus RTU, configured as slave.
F18	**Address** The system will be equipped with hardware dip switches to set the node address.

© Sesotec ASM S.r.l. – Company Confidential

4.2.1 Holding Registers

Register	Address (hex)	Register Type	Description
Frequency	0x1000	1 word	Vibration setpoint from 40 to 240.
Amplitude	0x1001	1 word	Vibration setpoint from 0 to 255.

4.2.2 Input Registers

Register	Address (hex)	Register Type	Description	
RMS Accelerometer Status	0x4000	1 word	RMS value of current acceleration	
Vibration Amplitude Status	0x4001	1 word	Current amplitude setpoint of vibration	
Probes Status	0x4002	1 word	Probes bit mask	
Alarms[1]	0x4003	1 word	0	No Alarm
			1	Power section fault
			2	Accelerometer fault
			4	Feeder fault
			8	Level Probes Fault

[1] The alarm signal can be OR'ed to indicate the presence of multiple failure.

5 NON-FUNCTIONAL ATTRIBUTES

5.1 Availability

Code	Function
F19	**Reliability** The system will be a highly reliable in order to guarantee 24/7 operation with minimal downtime and service requirements.
F20	**Uptime** The system will grant a minimum uptime of 99,9% if regular maintenance is granted according to manual instructions.

© Sesotec ASM S.r.l. – Company Confidential

6 ENVIRONMENT

6.1 Environmental and Utilities Specifications

Code	Function
F21	**Power Supply** • Voltage for control stage: 24 VDC; • Voltage for power driver stage: 115/230 VAC; • Frequency: 50/60 Hz.
F22	**Temperature** • Storage range from -20ºC to + 70ºC; • Operating range from 0ºC to + 60ºC.
F23	**EU Certifications** Design compliance with: • CE; • LVD; • ROHS.
F24	**US Certifications** Design compliance with: • UL; • CSA.

6.2 Installation

Code	Function
F25	**Type** The board will be installed on a DIN rail.

7 GLOSSARY

Term	Description
FSM	Finite State Machine
BIST	Built-In Self-Test
L1, L2, L3	Level Probes

© Sesotec ASM S.r.l. – Company Confidential