

	Verification Test Protocol XY-Pen Plotter <small>XYPP_29_VerP.docx</small>	Doc. #	XYPP_29_VerP
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Version	Description of Change	Name	Date
1.0	Initial	Parul Vivek Sunder rao	18-09-2023
2.0	VerP #8 and #9 added	Pandaraboyana, Dheeraj Kumar	25-09-2023
3.0	VerP #10, #11, #12 and #13 added	Nitin Khule	28-09-2023

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1 Subject

Test item: XY Pen Plotter, Doc: # XYPP_29.xlsx

Report refers to Technical Specification doc: Group_29_Technical Specification. xlsb

A pen plotter is a computer-controlled device that utilizes pens or markers to generate precise and accurate drawings on paper. This project seeks to create a fully operational pen plotter by employing specific components and technologies. The objective is to demonstrate the seamless integration of hardware, software, and mechanical elements to accomplish a designated task.

The subsequent document outlines the validation process for the pen plotter constructed by Team #29 during the MERO 22/23 course. The assembly took place in the workshop module for pen plotters during the summer term of 2023. This document references the technical specifications, defining the requirements to be validated, and elucidates the corresponding verification routines and procedures, including the criteria and limits for verification.

The verification protocols are followed by subsequent verification tests, presenting the results in alignment with the protocols outlined in this document.

Name:	Parul Vivek Sunder Rao	Signature:	Pandaraboyana, Dheeraj Kumar	Signature:
Function:	Testing Engineer		Manager Validation	
Dep.:	MERO_Validation		MERO_Validation	
Date:	



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2 Verification Protocol

Verification Protocol					
VerP #	ref to TS #	Test procedure (description of routine)	Verification Criterion	Ref. # (i.e. test protocol, etc)	Domain (HW/SW/ME/ALL)
Application					
VerP1	TS5	Setup pen plotter on a stable surface. Then draw Nikolaus house 10 times.	10 Nikolaus Haus drawn	Group 29_Technical Specification.xlsb	ALL
General Functions					
VerP2	TS1	Put the pen plotter into a box of 56x42x39 cm provided by Uni Lab.	Fits in box with lid closed	Group 29_Technical Specification.xlsb	HW
VerP3	TS1	Place the pen plotter assembly on a measuring scale with an accuracy of ± 1 gm. Take 3 readings and find out their mean value.	Mean of three weight measurement is well below 3500gm	Group 29_Technical Specification.xlsb	HW
VerP4	TS1	Run the Pen Plotter continuously across the paper for 30 min.	Continuous drawing upto 30 min at a time.	Group 29_Technical Specification.xlsb	ALL



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General Functions

VerP5	TS1	Start stopwatch, activate plotter with button, run stopwatch concurrently. Stop timer after drawing completion. Take 3 readings and find out their mean value.	Average Time taken <40 seconds	Group 29_Technical Specification.xlsb	ALL
VerP6	TS1	Move the Pen from point A (0,0) to Point B (100,100) 10 times and measure the error at Point B for each cycle.	Average error $\leq \pm 0.24\text{mm}$	Group 29_Technical Specification.xlsb	ALL
VerP7	TS1	Start the pen plotter and take noise level measurement by sound level meter. Take 5 readings and find out their mean value.	Mean of three noise measurement is $\leq 60\text{ dBA}$	Group 29_Technical Specification.xlsb	HW/ME

Module Motor Controller Electronics and Wiring

VerP8	TS8	Confirm switch functionality, halt plotter movement when contacted by levers, preventing overtravel and ensuring accurate and safe plotting. Check 10 times.	Overtravel prevention, accurate and safe plotting.	Group 29_Technical Specification.xlsb	HW
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Module Base Plate					
VerP9	TS8	Align the plotter for accurate plotting within the maximum A4 size. Perform 10 test plot using an A4-sized drawing media.	Maximum size of drawing media = A4.	Group 29_Technical Specification.xlsb	HW
Module Pen Holder / Carriage					
VerP10	TS8	Gather pens, position them and measure the diameter by Vernier callipers. Record the measurement results for each pen.	The diameter is less than 15mm	Group 29_Technical Specification.xlsb	ME
VerP11	TS8	Drawing media is positioned correctly, and maximum thickness of drawing media (wood base, etc) 3cm.	Maximum thickness of drawing media = 3cm.	Group 29_Technical Specification.xlsb	HW/ME
Module Coding, Control & User Interface					
VerP12	TS8	Power on, calibrate for accuracy (repeat 5 times), test emergency stop. Establish reliable starting point, align X and Y axis, move to specific point & check error.	Calibration (5 times), X and Y alignment, move to point, check error and usage of emergency stop.	Group 29_Technical Specification.xlsb	SW

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