

BOD2 System Verification

Omron Version:		Device	IP/Name	User	Password
Printer Config:		IPC			
Duet version:		Route			
Printer version:		Duet			
Location:		Cam 1			
Responsible Eng. (COBOD, initials)		Cam2			
Printer serial #:		Wi-fi			
Printer weight:			Ue	Hz	le
Printer year:		EU/US:			

This document provides the steps to perform after each printer installation to verify that the installation is correct. It is not meant as a guide but should be used with the BOD2 SOP, which contains all relevant guidance on each step.

This document proves as the verification that the printer is installed on-site, and a signed copy will be shared with the customer and stored internally for reference. Any items listed in this document as missing or faulty are the responsibility of COBOD to provide.

Use this document's installation verification to check off each point and list all issues on the SAT report on the last page.

Overview & Sequence

#	Phase	Description
0.	Overview and Prerequisites	Overview of the processes involved for complete system check as well as validation of machine parts and elements, prior to the system verification processes
1.	Installation Verification	Printer Full assembly and setup following guidelines for correct distances and Z alignment verification: Zc to Zc, Z perpendicularity Y-X-Y height alignment using Multiline laser X-Y perpendicularity verification Static and Echain cable installation
2.	Operational Verification	Operational verification, performance verification, system verification
3.	System Verification [SAT]	SAT print using customer recipe, only customer recipe with D.fab solution *Minimum of 1h print *Centerlines containing challenging segments, i.e.: sharp corners along both X and Y *Minimum of 3 layers must be performed at 200+mm/s and carefully observed, highest speed possible for the printer and the site
4.	Generate SAT Report	*Note all relevant issues during Operational Verification, Performance Verification as well as SAT stages. *Reflect on aspects of the system and elements to be either corrected or adjusted prior shipment as well as during on site installation [SAT]

Contents

Installation Verification.....	2
Operational Verification.....	3
FAT Report	4

Installation Verification

Shipment inspection	
	Inspect shipment for missing items [according to detailed shipping list]
	Inspect shipment for visible damage from transport
Site Preparation:	
	See what the printer size configuration is to be assembled for system validation. Consult COBOD calculator [link] and arrange the concrete blocks accordingly.
	If trusses were assembled, ensure that the toothrack is still calibrated correctly
[Mechanical] Printer Assembly	
	Reassemble trusses if needed, refit Z Top hat hooks, etc.,
	Drive Z carriages on Z trusses to a particular distance to the steel plate. Distance might vary depending on clearance inside the print area. See “ Operations Manual v1.03 ” for detailed instructions for operating Manual Control Box for Zs. This should be done by manufacturing.
	Confirm that there are no issues with mechanical assembly: carriage fits snugly – there is no play if carriage is moved to sides, along the Y direction.
	Confirm, there are no scarping sounds while moving carriage up/down. Raise Z legs.
	Using Spirit Level , make sure that all Zs are 89.95 – 90.00 degrees perpendicular to the floor
	Using Distance Laser and Multiline Laser , calibrate both rows of Zs to be parallel and at equal distance to the opposite side. Consult the BOD2 calculator for the measurements. Z to Z distance along X cannot be shorter than stated in calculator and should not be exceeded by more than 3mm.
	Crane on Y trusses and X axis.
	Calibrate X axis to be perpendicular to the Y trusses. Use Multiline Laser and position it on Y truss: one laser aligned with Y truss and other with X.
	All cover plates mounted on X + Y axes
	Stickers applied on all Axes
[Electrical] Printer Assembly. For detailed information, see “ BOD2 Cabling instructions v1.pdf ”	
	Z1 -> Zn -> Zn ... and Z2 -> Zn -> Zn ... Y1 -> Y2 [Static Cables]
	Place all E-chain cables in the cable trays with correct orientation. Plug ends to appropriate carriages. Pay attention to direction of E-chain loops. This includes the following cables: Ebox -> Z1, Z1->Y1, Y1->PH, Y2->Z2
	Make sure all Emergency Stop Buttons on Zs are wired and the other end of the cable is plugged in to the corresponding Z carriage.
[System updates]	
	Omron is updated to the latest revision + Put a password on the program and note this down!
	DUET interface is updated to the latest revision, Duet 3.3

	DUET firmware is updated to the latest revision, Duet 3.4.1
	Raspberry pi is updated to latest revision

Operational Verification

Operational Verification	
	Safety [Estop buttons, collision detection, Safety Override] in standstill
	Movement of all Axes via PLC (SoftNA)
	Movement of all Axes via Duet (web interface)
	Safety [Estop, collision detection] during movement
	U Axis Mechanical and Programming check: belt and/or cog slippage as well as gear ratio
	Material level sensor in hopper [response and calibration]
	Pump connection signal
	Dosing system activation
	Realignment of Y and Z [SoftNA]
	Test Remote Control (Is printer "online" via Wieland, if connected to internet?)
	Check Signals from Homing Clickers and perform Homing. Pay attention to the correct direction of axes movement during homing, as the wrong direction indicates wiring issues.
	PH Cameras: Test connection and adjust angle
	Move Y and X axes in full length of axes, Validate movement length (with laser measurement)
	Move Z axes Up/down at full speed (50mm/s) while Y axis is in extremities position (min + max), Validate movement distance (with laser measurement)
	Rewind plugin installed and working
	Extruder screw is in the correct direction
	The dosing system is primed and working
	Ensure the Dosing setting is identical in SoftNA and in the pump
	Calibrate the dosing system
	Check that access through Remote Desktop app + check the IPC IP (cmd -> ipconfig /all") IP 192.168.1.90 is standard.

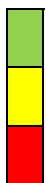
Performance Verification	
	Dry run 1 [1h]. Comment? X/Y Motor Torque data?
	Dry run 2 [1h]
	Measure for X and Y backlash, if noticeable

System Verification. For details, refer to "SAT Print Standard v101"	
	Minimum of 1.5h print
	Centerlines containing challenging segments, i.e.: sharp corners (25 < radius < 40) along X & Y
	Minimum of 3 layers at 250 mm/s and carefully observed

SAT Report

To contain data from SAT and full system verification as well as open-ended form to be filled regarding mechanical, electrical, system and parts issues that has been or is to be fixed in later visits.

				Date:		
#	Issue and Description	Category	Status	Severity (Minor/Major)	Staff in charge of the fix	Time spent on solution (hours)
Total number of issues:						



Fixed

Missing item

Additional service needed on site

I hereby acknowledge that the BOD2 has been installed on-site, and the site team has received the necessary training to operate the equipment. All missing or faulty items have been corrected or noted in the SAT report, and a corrective plan has been made.

	On Behalf of COBOD	On Behalf of customer
Date:		
Name:		
Signature:		