HP SitePrint Robot
User Guide

SUMMARY

How to use your product.

About this edition

Edition 3, September 2024

Legal notices

The information contained herein is subject to change without notice.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Table of contents

1 Introduction

An introduction to your product.

Welcome to your robot

HP SitePrint is a robotic solution designed to automate site layout in building construction. HP is combining its printing knowhow and robotics technology to revolutionize construction site layouts, bringing breakthrough efficiency.

It is an end-to-end suite of technologies consisting of a rugged and autonomous robotic device designed to operate in the construction site, a set of cloud tools to manage the full layout process and a portfolio of inks designed to operate over different surfaces, environmental conditions, and durability requirements.

HP SitePrint will bring accurate layouts and groundbreaking performance and productivity to construction projects. Its precision is in a class of its own. It is consistently accurate on implementation and can handle complex layouts to help you get every job done exactly right. It also helps you to reduce layout costs, improving productivity by laying out faster and with less workforce, thanks to its autonomous printing with obstacle avoidance.

Documentation

Full documentation is available for your product.

The following documents can be downloaded from http://www.hp.com/go/SitePrintRobot/manuals:

- Introductory information
- Site preparation guide
- Assembly instructions
- User guide (this document)
- Legal information
- Limited warranty

Safety precautions

Before using your robot, read, understand, and follow these safety precautions, and your local Environmental Health and Safety regulations.

This robot is not suitable for use in locations where children, or people not involved in the use of the robot, are likely to be present.

⚠ **WARNING!** It is mandatory to have the appropriate technical training and experience necessary to be aware of hazards to which you may be exposed in performing a task, and to take appropriate measures to minimize the risks to yourself and to others. It is the responsibility of the robot owner or manager to facilitate complete training of all possible robot users. Failing this requirement may result in personal injury or damage to equipment.

Perform the recommended maintenance and cleaning tasks to ensure the correct and safe operation of your robot.

Operations must be supervised at all times.

General safety guidelines

Please read these safety guidelines carefully.

There are no operator-serviceable parts inside the robot except those covered by HP's Customer Self Repair program: see http://www.hp.com/go/selfrepair. Refer servicing of other parts to qualified service personnel.

Take these precautions before starting work:

- If the working area has access to a lower level (floors under construction above ground level, open ramps, uncovered underground work areas, or stairwells), ensure that local safety rules are followed to avoid the risk of falling people or objects. Ask your EHS site representative to confirm that the site is safe before starting a job; if necessary, inspect the working area together with the EHS site representative to avoid residual risks.
- Ensure that no people, machinery, or unnecessary objects are present in the working area.
- Check that during transportation and handling of the robot there is no appreciable damage, deformation, or displacement of any component (sensors in particular) and that there are no ink leaks. If you find any problem, do not start a job, and contact your service representative.
- This robot is provided with a safety function to avoid falling over. Disabling this function may result in a hazardous operation. It is important to clean and maintain the sensors regularly, as described in the robot maintenance instructions.
- Perform the required calibrations, verifications, maintenance, and cleaning tasks to ensure the correct and safe operation of your robot.
- The robot contains sensitive electronic components. Check that the working area is not exposed to strong electromagnetic fields, which can cause robot malfunction.
- Discharge yourself of static electricity each time before handling the robot in any way.
- Do not operate the robot with covers or doors open or wrongly assembled.
- Avoid operating the robot on windy days and over the enviromental specifications operative ranges or locations.

Turn off the robot, by pressing the disconnection button and removing the battery, and call your service representative in any of the following cases:

- The enclosures are damaged.
- The robot has been mechanically damaged or misassembled.
- Liquid has entered the robot.
- Ink is leaking inside the robot.
- Ink is leaking outside the robot and is out of control.
- There is smoke or an unusual smell coming from the robot.
- The robot has been dropped and a sensor may have been damaged.
- The robot will not start.
- The robot is not operating normally.

Press the disconnection button, shelter the robot, and remove the battery in any of the following cases:

- During a thunderstorm, electrostatic discharges, or other electromagnetic interference
- Before the onset of rain, snow, hail, or other precipitation (the robot is not designed to work in these conditions)
- If the robot is not working and exposed to outdoor high temperatures and sunshine
- When the robot is parked and people not involved in the use of the robot could approach the working area
- During a power failure

Use only HP-branded ink. Do not use unauthorized third-party ink.

Read and follow the instructions on safety warning labels on the robot before using it.

Take these precautions after finishing a job:

- Avoid storing the robot where it will be exposed to sunlight, or very high or low temperatures.
- Avoid storing or parking the robot where it can be exposed to rain, snow, hail, or other precipitation, or to any kind of liquid or dust.

Material storage, handling, and disposal should be done according to local laws. Follow your Environmental Health and Safety processes and procedures. For further information, see the Safety Data Sheets (SDS), which you can find at http://www.hp.com/go/msds.

Electric shock hazard

The battery-charger assembly uses a local power cord. Unplug the power cord if you notice smoke or an unusual smell when charging the battery.

⚠ **WARNING!** The internal circuits of the battery-charger power module operate at hazardous voltages capable of causing death or serious personal injury.

To avoid the risk of electric shock:

- The battery-charger assembly should be connected to earthed mains outlets only.
- Always use the battery charger in indoor locations.
- Do not attempt to dismantle the battery charger or power module.
- Do not manipulate the power module or power cord. If you detect any imperfection, contact your service representative for assistance or change of component.
- Do not use electrical components not supplied with the robot.
- Do not try to use the battery charger for any purpose other than charging the robot battery.

Heat hazard

Take care when touching the external enclosure or handling the robot after long exposure to outdoor high temperatures.

To avoid personal injury, let the robot cool down before performing internal maintenance operations.

The touchable surfaces of the removable battery may exceed temperature limits if the robot is exposed to high temperatures, or after abnormal robot operations.

Fire hazard

The customer is responsible for meeting the robot's requirements and the Electrical Code requirements according to the local jurisdiction of the country where the equipment is installed.

⚠ **CAUTION:** This product contains a battery; there is a risk of fire and burns.

To avoid the risk of fire, take the following precautions:

- Use only the battery supplied with the robot.
- To charge the battery, use only the charger supplied with the robot.
- Do not expose the battery to water, fire, or excessive heat.
- Avoid storing the battery in direct sunlight.
- Do not crash, disassemble, puncture, or short-circuit the connector terminals of the battery.
- Keep the battery out of reach of children.
- Keep the battery clean and dry.
- Use the battery only in the application for which it was intended.
- Do not use damaged components of the charger (power cord, power module, or the charger itself). Do not use the charger with other products.
- Ensure that the battery-charger power module is suitable for the power source to which it will be connected.
- When charging or removing the battery, try to avoid particles or liquid entering the battery compartment or charger.

- Do not operate the robot outdoors when it is raining.
- When closing the battery compartment, make sure it is fully closed, to keep out liquids and dust.
- Use the robot within its specified operating and storage ranges of temperature, humidity, and altitude.
- Do not insert objects through slots or doors in the robot.
- Take care not to spill liquid on the robot. After cleaning according to the maintenance instructions, make sure all components are dry before using the robot again. If a significant amount of liquid has entered the robot, contact your service representative.
- Do not clean the robot with pressurized water or a large quantity of water or other liquids. Follow the HP recommendations.
- Check the air filters regularly in accordance with the instructions in this guide, cleaning them if necessary. Do not remove the filters: if you think they should be removed, call your service representative.
- Do not use aerosol products that contain flammable gases inside or around the robot. Do not operate the robot in an explosive atmosphere.
- Do not block or cover the openings of the robot.
- Do not open the robot or manipulate anything inside it. The robot may use ethanol-based inks, which could cause a risk of fire if they leak.
- Follow all maintenance instructions.
- Proper maintenance and genuine HP consumables are required to ensure that the robot operates safely as designed. The use of non-HP consumables may present a risk of fire.

For more information regarding the battery and its storage conditions, follow the manufacturer's recommendations at the website whose URL appears in the text on the battery body.

Explosion hazard

To avoid the risk of explosion, take the following precautions.

⚠ **WARNING!** Ink-based ethanol leakages and especially vapors can be explosive in air in some concentrations. Take precautionary measures against static charges, and keep the robot away from sources of ignition.

⚠ **WARNING!** Remove the battery from the robot before putting the robot into its case for transportation, and before starting any maintenance procedure.

NOTICE: The equipment is not intended for hazardous locations or ATEX classified zones: ordinary locations only.

- Follow all maintenance instructions promptly, as needed (cleaning, filter replacement, ink-circuit purge, and so on).
- Smoking, candles, welding, hot surfaces, and open flames should be forbidden close to the equipment and the ink-supply storage area.
- Avoid working in areas with powerful radio frequencies or electromagnetic fields in general.
- Do not work in areas where sparks can fly.

- Do not open the robot or manipulate it internally. Internal ink leakages or ink-vapor emissions, combined with the generation of ESD (ElectroStatic Discharges) inside the ink-circuit pipes and fittings when removed or generated from contact with people, could create an explosion or fire risk.
- Use HP recommended inks only. Do not use unauthorized third-party inks.
- In case of ink leaks, all personnel should be freed from static electricity by discharging it before handling the robot.
- Stop operation, remove the battery, and contact your service representative if any ink leak is detected.

Mechanical hazard

The robot has moving parts that could cause injury.

To avoid personal injury, take the following precautions when working close to the robot:

- The robot should be supervised during its operation.
- Always keep clean the four robot-safety floor sensors, and check frequently that they are working correctly.
- To reduce the risk of the robot falling onto someone from a height, ensure that the working area meets all the requirements of local safety laws according to the robot's size, weight, and operation. Get the approval of your EHS site specialist before starting work.

  HP always recommends the use of safety nets or other protective barriers.
- To reduce the risk of the robot colliding with people, try to remove people from the working area. If they need to be there, remind them of the risk.
- Although the usual direction of operation of the robot is forward, please also be aware of the robot's backward movements and rotations when working in close proximity to it to avoid any potential collisions with the robot.
- Use personal protective equipment (PPE) as a preventive measure in case the robot runs into you during operation.
- Keep your clothing and all parts of your body away from the robot's moving parts.
- Avoid wearing necklaces, bracelets, and other hanging objects.
- If your hair is long, try to secure it so that it will not fall into the robot.
- Take care that sleeves or gloves do not get caught in the robot's moving parts.
- Do not touch gears or moving parts during operation or maintenance. Press the disconnection button and remove the battery before performing maintenance.
- Do not operate the robot with covers or doors open or wrongly assembled.
- Do not park the robot on a slope of more than 4.4% inclination, to avoid it sliding down.
- Handle the robot with care to avoid dropping it. If you drop it, call your service representative to check it for damage that may affect your safety.

Light radiation hazard

Light radiation is emitted from the warning lights.

This illumination is in compliance with the requirements of the exempt group of IEC 62471:2006: *Photobiological safety of lamps and lamp systems*. However, you are recommended not to look directly at the LEDs while they are on. Do not modify the module.

Avoid looking directly at the red LED light from the front and rear sensors.

Laser radiation hazard

Laser radiation is emitted from the obstacle-avoidance camera installed only in product model numbers A2PS9A and A2PT0A.

The laser complies with the requirements of Class 1 of IEC 60825-1: 2014: *Safety of laser products*.

However, you are recommended not to look directly at the camera while it is on. Do not modify the module.

Chemical hazard

There may be flammable liquid in the ink cartridges. Keep them away from heat, hot surfaces, sparks, open flames, and other sources of ignition.

Inks might be classified, see the safety data sheets available at http://www.hp.com/go/msds to identify the hazardous chemical ingredients of your consumables.

Ventilation

Fresh air ventilation is needed to maintain indoor comfort levels.

Ventilation should meet local Environmental Health and Safety (EHS) guidelines and regulations.

Ink handling

HP recommends that you wear protective gloves, protective clothing, and eye protection when handling ink-system components.

Please check the Safety Data Sheets available at http://www.hp.com/go/msds before handling the ink.

Ink, and components contaminated by ink, should be disposed of according to local laws. Follow your Environment Health and Safety processes and procedures. For further information, see the Safety Data Sheets.

The robot can work with ethanol-based inks. When handling or storing these inks, keep them away from sources of ignition, avoid high temperatures, and preferably store them in open locations.

Warnings and cautions

Symbols are used in this document to ensure the proper use of the robot and to prevent it from being damaged. Follow the instructions marked with these symbols.

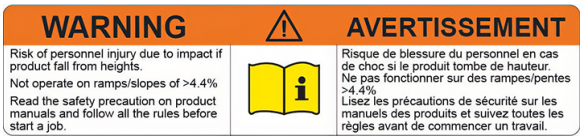
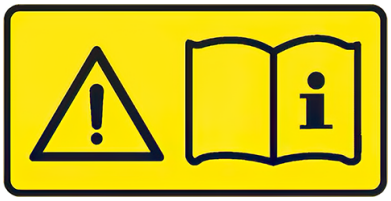
⚠ **WARNING!** Failure to follow the guidelines marked with this symbol could result in serious personal injury or death.

⚠ **CAUTION:** Failure to follow the guidelines marked with this symbol could result in minor personal injury or damage to the robot.

Warning labels

Safety labels are included on your robot. See the table to understand what the labels mean; they are important.

Table 1-1 Warning labels

Label	Explanation
	Risk of personal injury due to impact if the robot falls from a height. Do not operate the robot on slopes of more than 4.4% inclination. Read the safety precautions in this guide and follow all instructions before starting a job.
	Read the documentation. Read the safety precautions in this guide and follow all instructions before starting a job.
	Risk of burning when removing the battery. Read the safety precautions in this guide and follow the instructions when removing the battery.

Control-panel warnings

The control panel may display warning messages.

If a window appears on your control-panel screen with a warning of **Flammable gases detected**, follow these steps:

1. Stop the robot and remove the battery.

2. Check whether there is visible ink leakage from the robot:
    - If ink leakage is detected, contact your service representative for assistance. There may be a risk of fire or explosion.
    - If no ink leakage is visible, check whether any alcohol or other flammable liquid has been spilled nearby that could have caused the robot's internal sensors to detect flammable gases. Sometimes, but not always, chemical odors help to identify the cause.
3. If you cannot identify any cause of the warning, take the robot somewhere else, far from the current working area, insert the battery, start up the robot, and wait for the fan to remove the internal gases. After 15 minutes:
    - If the warning persists, stop the robot, remove the battery, and call your service representative.
    - If the warning no longer appears, inform the EHS representative for the working area of the incident before resuming work.

General cleaning instructions

For general cleaning, a lint-free cloth dampened with distilled water is recommended. Allow the cleaned part to dry, or use a cloth to dry it completely.

Do not spray fluids directly onto the product. Spray the fluid on the cloth used for cleaning.

To remove stubborn dirt or stains, moisten a soft cloth with water and a neutral detergent, or a general-purpose industrial cleaner (such as Simple Green industrial cleaner). Remove any remaining soap foam with a dry cloth.

⚠ **CAUTION:** To clean the robot's printhead, follow the specific instructions in Clean the printhead on page 60.

For glass surfaces, HP recommends using a soft, lint-free cloth lightly moistened with a non-abrasive glass cleaner or with a general-purpose glass cleaner (such as Simple Green glass cleaner). Remove any remaining soap foam with a lint-free cloth dampened with distilled water, and dry the glass with a dry cloth to prevent spotting.

⚠ **CAUTION:** Do not use abrasives, acetone, benzene, sodium hydroxide, or carbon tetrachloride on glass surfaces; they can cause damage. Do not place or spray liquid directly onto the glass, as the liquid might seep under the glass and damage the device.

HP recommends using a canister of compressed air to remove dust from electronic or electrical parts.

⚠ **CAUTION:** Do not use a water-based cleaner for parts with electrical contacts, as it may damage electrical circuits.

⚠ **CAUTION:** Do not use wax, alcohol, benzene, thinner, ammonia-based cleaners, or other chemical detergents, to avoid damage to the product or the environment.

⚠ **CAUTION:** Ink cleaning and maintenance materials should be disposed of according to local laws. Follow your Environmental Health and Safety processes and procedures. For further information, see the Safety Data Sheets, which you can find at http://www.hp.com/go/msds.

⚠ **CAUTION:** Ink-based ethanol leakages and especially vapors can be explosive in air in some concentrations. Take precautionary measures against static charges, and keep the robot away from sources of ignition. See Explosion hazard on page 5.

NOTE: In some locations the use of cleaning products is regulated. Ensure that your cleaner follows federal, state, and local regulations.

Transportation and storage

Transportation and storage instructions aim to ensure that your robot is safe and will function correctly.

Keep your robot safe and in order at all times. Take the following precautions when transporting or storing it:

- Turn off the robot and remove the battery.
- Turn off the HyperX joystick by selecting the USB mode (left position) in the switch.
- To prevent the nozzles from clogging the next time you try to print, clean the printhead with a lint-free cloth. In order to clean the nozzle plate you should dampen the cloth using a cleaning agent based on substances compatible with the solvent ink (see ink composition at http://www.hp.com/go/sds), preferably ethanol.

NOTE: In some places the use of cleaners is regulated. Make sure your cleaner complies with federal, state, and local regulations.

- Before transporting the robot by air or sea, use the purge procedure to deplete or remove ink from it.
- Remove the battery cover before putting the robot in its case.

CAUTION: Batteries should not be kept in the same case with ethanol ink cartridges or with any other items classified as dangerous goods for transportation, such as the robot after use. Use qualified packaging to transport the battery, meeting local, national, and international regulations.

WARNING! Batteries are classified as dangerous goods for transportation Class 9, and ethanol ink cartridges and cleaning fluids are classified as dangerous goods of transportation Class 3. Before transporting the product, ensure that you meet all the regulations for the transportation of dangerous goods.

- HP solvent-based ink cartridges have special requirements for transportation. For further information, see the Safety Data Sheets, which you can find at http://www.hp.com/go/msds.
- Keep ink cartridges stored in a temperate environment. Cartridges may leak if stored below freezing temperature (0°C).
- Dangerous goods transportation regulations may not permit transporting articles classified differently under those regulations. Before shipping your product, ensure with your transport agent that the shipment complies with all the regulations for the transportation of dangerous goods, and that it is labeled adequately.

TIP: Whenever the robot is not operating, it should be kept indoors and in its case.

Useful links

Locations on the Web that may be useful to users of this robot.

SitePrint Cloud: https://siteprint.hp.com.

SitePrint control panel: http://192.168.10.1.

Product support page: https://support.hp.com/us-en/product/details/hp-siteprint-robot/2101375953.

When you need help

In most countries, support is provided by HP support partners (usually the company that sold you the robot). If this is not the case in your country, contact HP Support on the Web.

Help is also available to you by telephone. What to do before you call:

- Review the troubleshooting suggestions in this guide.
- Please have the following information available:
  - The robot you are using: the product and serial numbers

    NOTE: You can find this information on a label at the rear of the robot.

  - If there is an error code on the control panel, note it down.

Telephone number

Your HP Support telephone number is available on the Web.

Please visit https://www.hp.com/us-en/contact-hp/ww-contact-us.html.

2 Product components

The following views of the product illustrate its main components.

Robot box contents

The separate components stored in the robot box.

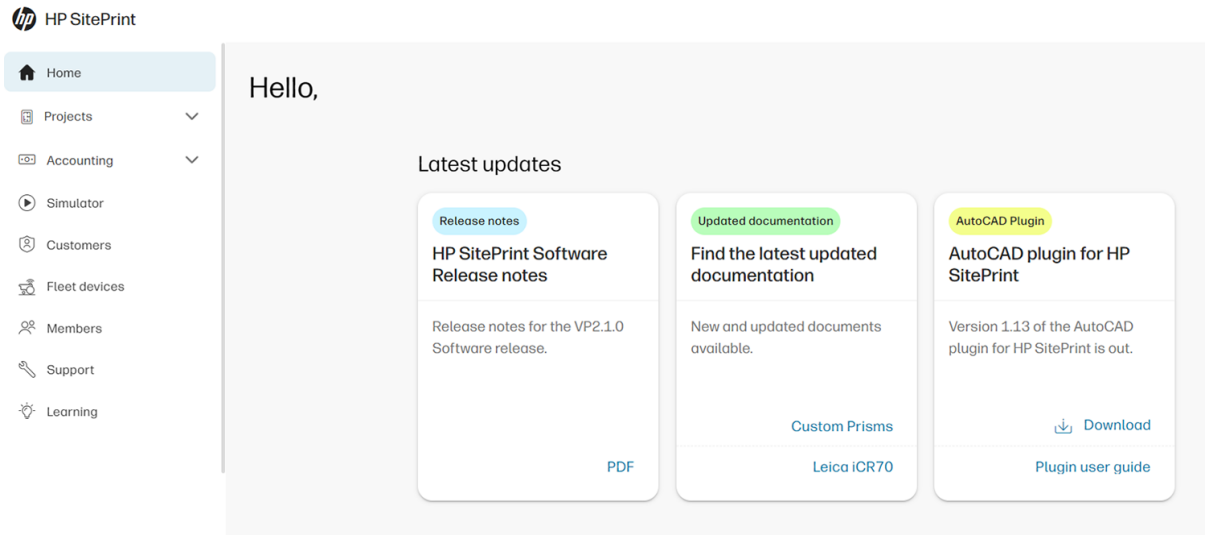
1. Ruggedized case with handle and wheels
2. Robot and documentation, including:
   - Installation instructions (QR code)
   - Introductory Information document
   - Battery labels for two replaceable li-ion batteries
3. Extraction handle

4. Two replaceable li-ion batteries
5. Battery charger, including:
    - Battery charger dock
    - Power supply unit
    - Power cord
6. Battery cover
7. Remote control (USB-C cable required to charge included)
8. Mini-prism bipod (mini-prism not included)
9. Empty spray bottle to clean the printhead
10. Space for cartridge transportation (cartridge not included)

HP SitePrint solution components

These components work together in the HP SitePrint ecosystem.

Cloud tools



- Fleet management
- Quotations
- Accounting
- Job submission

Robot

- High-accuracy autonomous positioning and portable printing device
- 4G-enabled
- Wi-Fi and Bluetooth connections

Control panel

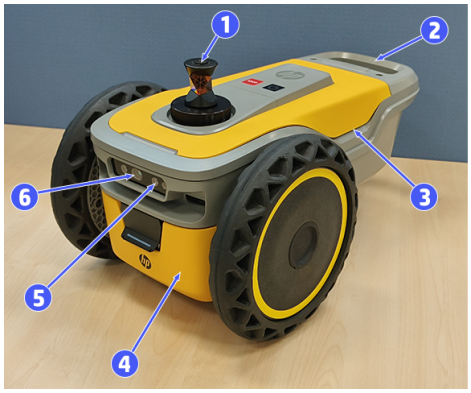
- Touch-screen tablet remote control and configuration
- Real-time print view

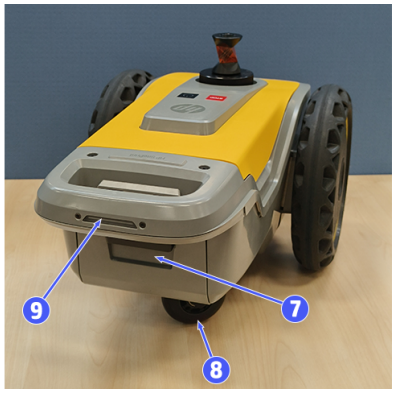
Robotic Total Station (RTS)

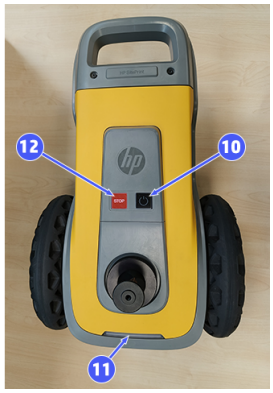
- Leica TS16
- Leica iCon iCR70/iCR80
- Trimble RTS573/773
- Topcon LN-150

Robot views and parts

Views of the robot and its components.



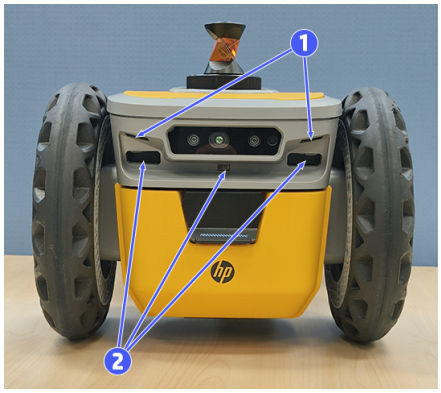


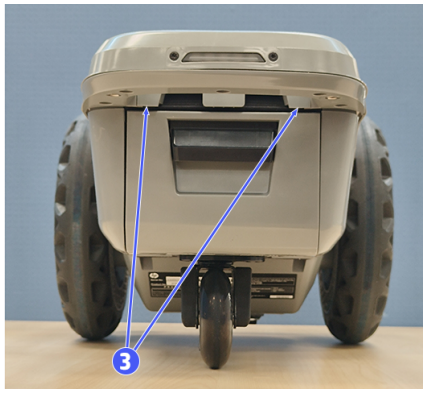


1. 360° prism
2. Handle
3. Ventilation
4. Battery door
5. Sensors
6. Depth camera
7. Ink supply
8. Center wheel
9. Rear lantern
10. On/off button
11. Front lantern
12. Emergency stop button

Robot sensors

The robot has sensors at front and rear to detect obstacles and possible hazards.





1. Front safety sensors: Each sensor projects a red light on the ground, and stops the robot if a cliff or hole is detected. The robot must be manually moved to a safe area.
2. LiDAR sensors: Detect cliffs, obstacles, and walls. They allow the robot to get closer to obstacles without triggering the safety sensors, which would block the robot.
3. Rear safety sensors: These are functionally the same as the front safety sensors.

NOTE: A malfunction in these sensors may result in a hazardous operation. It is important to clean and maintain the sensors regularly as described in the maintenance instructions.

For further information about the sensors, you can visit the robot and accessories category at https://siteprint.hp.com/app/learningwebsite.

HP SitePrint Robot Upgrade Kit 3.0

Upgrade Kit 3.0 enhances the hardware and software of your robot, providing improvements in productivity and autonomy.

The new hardware includes:

- New electronics: PCA upgrades for the electronic boards.
- Depth camera: A new depth camera creates a spacial assessment to improve obstacle avoidance.
- Front bumper: To maintain safety and to protect the robot.
- Safety sensors: The sensors are repositioned to enable the robot to approach closer to objects.

Table 2-1 Upgrade Kit 3.0 new functions

Function	Description	With new software	With new software and hardware
Obstacle shadowing	Avoid shadowed areas during navigation to prevent line-of-sight obstructions.	Yes	Yes
Cloud dashboard	New analytic dashboards allow users to monitor and optimize productivity across various job sites.	Yes	Yes
Productivity increase	New electronic system increases print output by improving navigation speed and efficiency.	No	Yes

Table 2-1 Upgrade Kit 3.0 new functions (continued)

Function	Description	With new software	With new software and hardware
Smart navigation system	Enhance LiDAR system capabilities with the integration of a new depth camera to reduce collisions and enable dynamic route adaptation for navigation efficiency.	No	Yes
Temperature range extension	Improved cooling system extends the maximum operating temperature from 40°C to 50°C.	No	Yes
Rear and front edge proximity	Safety sensors have been adjusted 2 cm closer at the front and 8 cm closer at the rear, enabling the robot to approach slab edges closely.	No	Yes

Improved productivity

The new driver software enhances print productivity by about 20%, for both interior wall and point layout applications.

- **Increased navigation speed**

  During a print job, the robot usually spends up to 61% of its time navigating. With the new electronic board and front bumper, navigation speed can be increased from 0.4 m/s to 0.7 m/s (a 75% improvement).

- **Reduced braking time**

  Whenever the robot prints an element, it makes two stops: one at the beginning and the other at the end of printing the element; three stops if we have a point with a text label. The new driver software saves one second in braking time every time the robot stops.

Improved autonomy

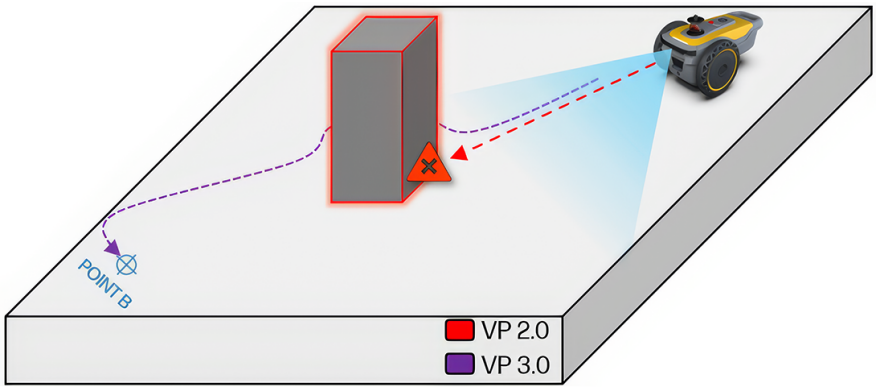
The new software and hardware enhances robot autonomy to reduce the need for user interventions.

- **Depth camera**

  By adding a depth camera to the front of the robot, we can create a 3D representation of the environment.

- **Smart navigation**

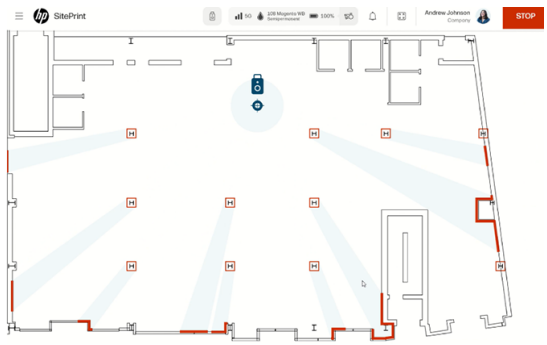
  The robot continuously monitors its 3D surroundings, allowing it to adapt its navigation trajectory in real time as the perceived obstacles (if larger than a beverage can) are added to the map to be considered while navigating. These obstacles are cleared if there is a second pass without noticing them (ray casting).



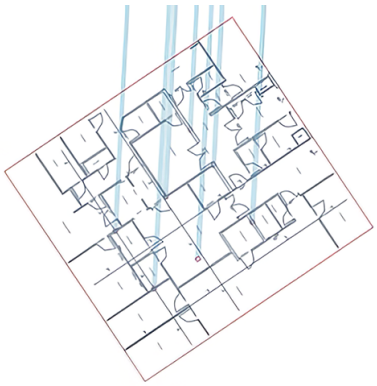
- **Shadowing**

  The new shadowing function helps the robot to maintain uninterrupted operation, even in areas with line-of-sight obstructions.

  When you enable the shadowing function in the RTS tab, we can identify and avoid navigating to the areas where the RTS may lose line of sight (such as behind columns), if we have identified these obstacles in the CAD.



HP recommends that, each time the CAD changes or the RTS is moved, the shadows should be reprocessed. HP also recommends creating a obstacle that consists of the bounding box of the map, to prevent the robot from trying to go outside the bounding box at any time.



User interface

The control panel provides a Web app with which you can control your robot and some functions of your compatible RTS.

To access the user interface, first connect your computer to the robot's Wi-Fi network, giving the password found on the other side of the QR code included in the package, or alternatively on the sticker found on the HyperX joystick. To access the user interface from your computer or tablet, you must open the Chrome browser and navigate to http://192.168.10.1.

TIP: For a better experience, save a direct access to this URL on your computer's desktop, so that the application will run in full-screen mode.

The user interface is designed to be used on a tablet in landscape mode. Most functions are also accessible in portrait mode. Some print-related functions are accessible from a mobile phone. See the tablet specifications to find out more about the tablet's specific requirements.

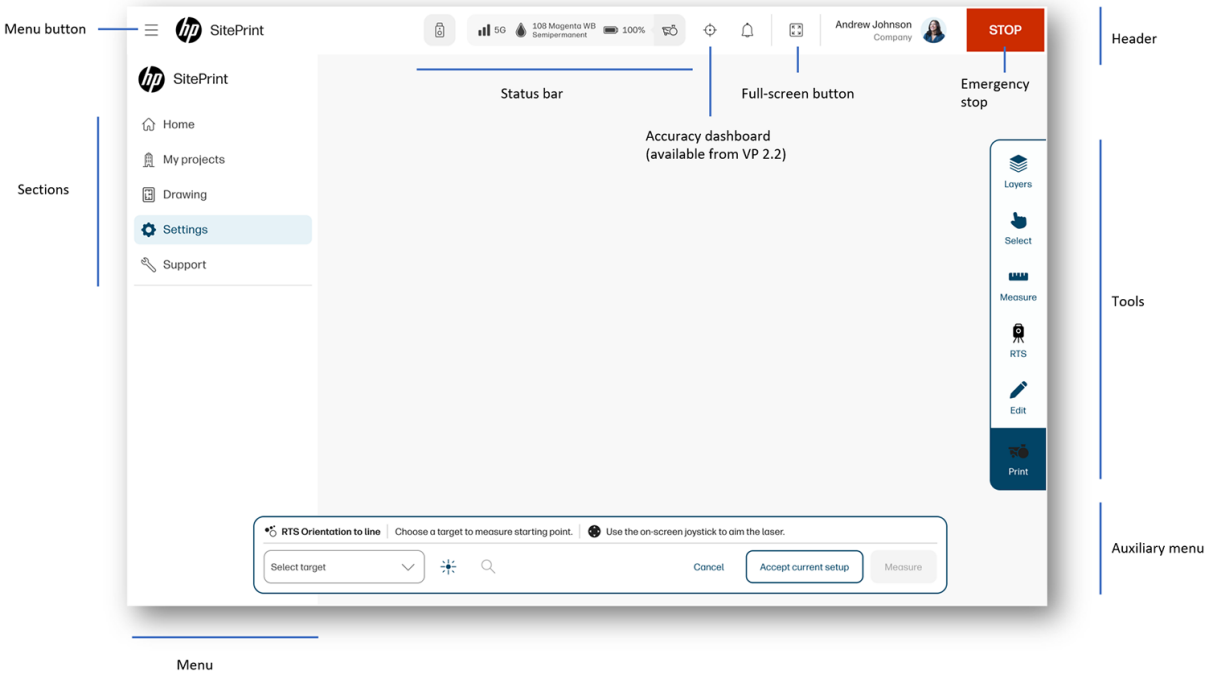
NOTICE: Only the Chrome browser is supported.

User-interface layout

The user interface is divided into a number of components that facilitate the setup of the user and robot settings, and the operation of the robot for layout.

The user-interface structure is described in the following diagram, and includes:

- Menu button
- Menu with sections
- Header with status bar, full-screen button, and emergency stop
- Tools menu
- Auxiliary menu



User-interface sections

In the user interface, you will see a menu on the left with the titles of various sections.

- Home
- My projects
- Drawing
- Settings
- Support

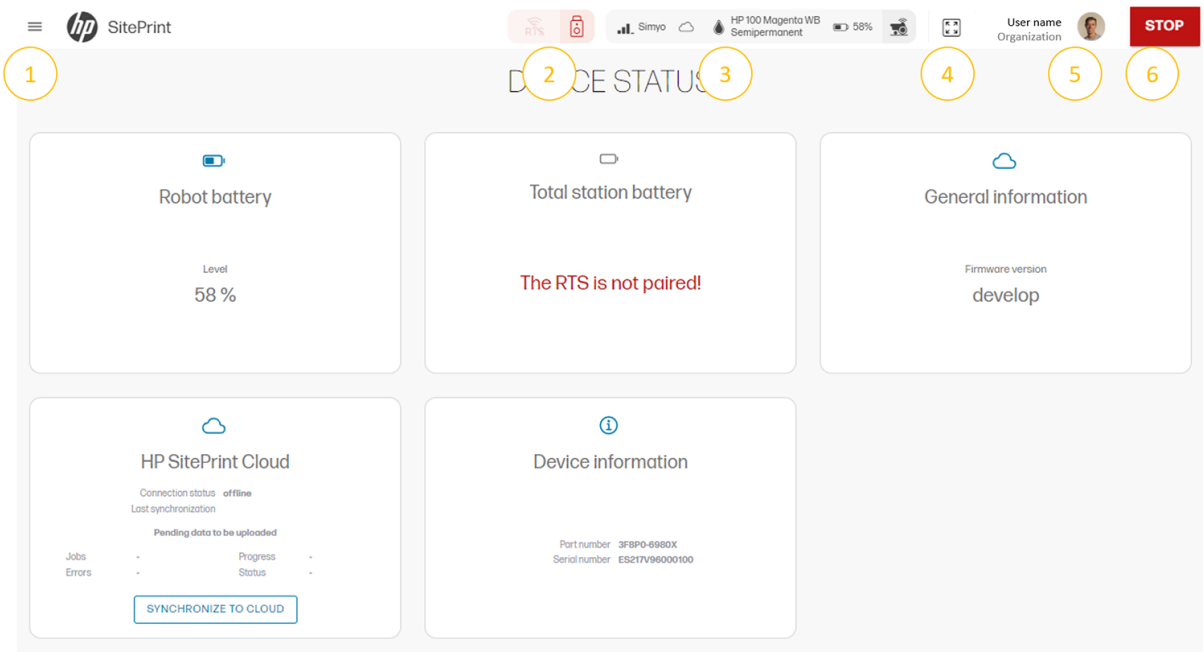
The Home section shows device data, under the title DEVICE STATUS.

Device status

The control panel displays the device status by default when the user interface is activated.

After the robot is turned on and the control panel is connected to the robot's Wi-Fi, you can access the user interface at the URL http://192.168.10.1.

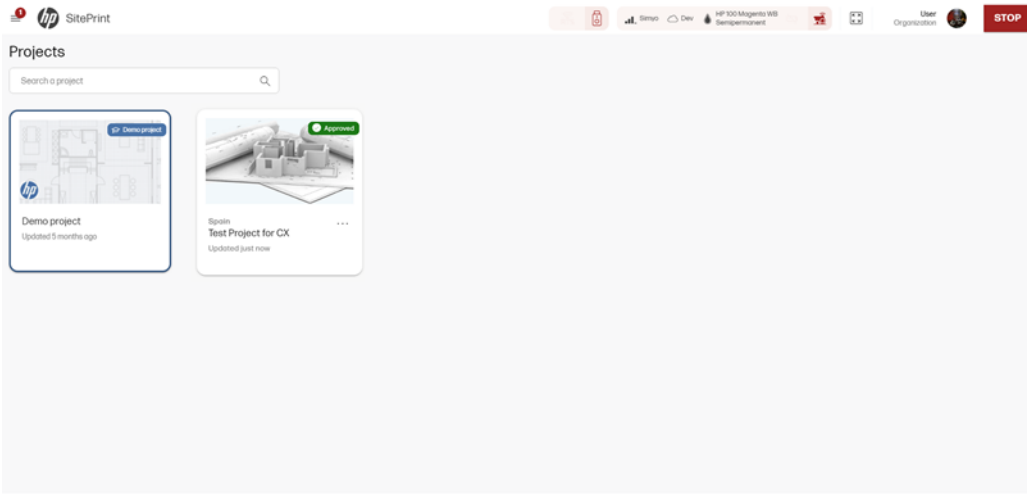
1. Control-panel menu
2. RTS status bar
3. Robot status bar
4. Full-screen button
5. User profile
6. Emergency stop

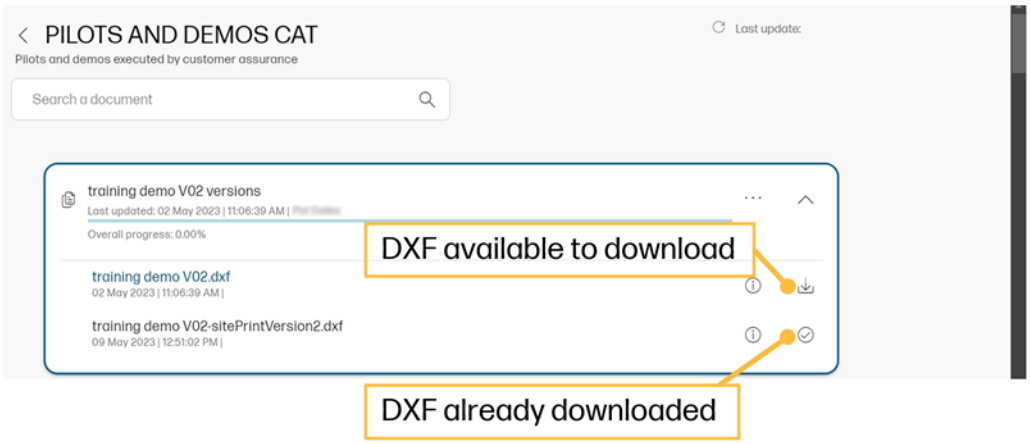


NOTE: The RTS indicators will appear only after the connection between the robot and the RTS has been established.

My projects

From the **My projects** tab, you can choose the project that contains the DXF file that you want to print from the HP SitePrint Cloud:





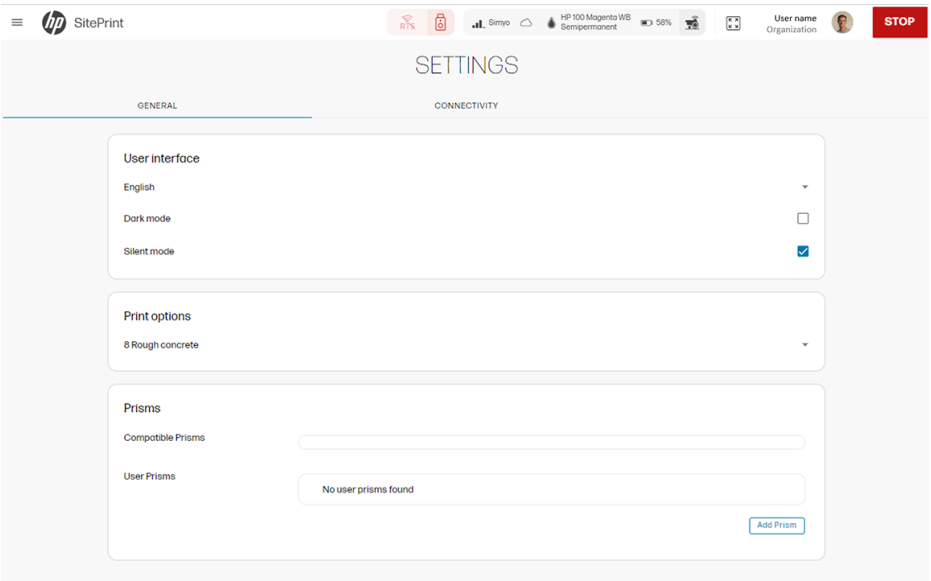
You can also download a DXF from the cloud to work offline. If you previously downloaded the file, when you are in an area without coverage, the robot can work with that file without having to connect to the Internet.

Settings

This section contains general and connectivity settings.

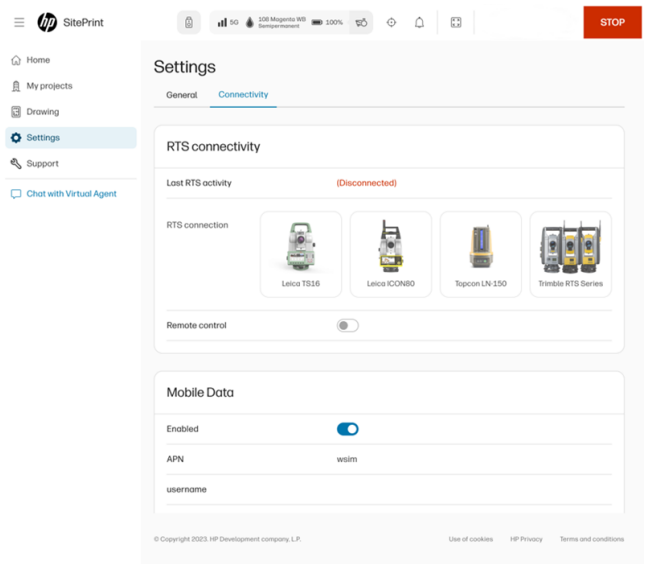
General

Select the material on which the robot will be conducting layout.



Connectivity

Use this tab to connect the RTS and the robot, and to enable or disable mobile data.



IMPORTANT: The prism selected in the user interface will override the model selected in the RTS. The user can restore the last RTS setup performed through the RTS tab in the Map view.

Support

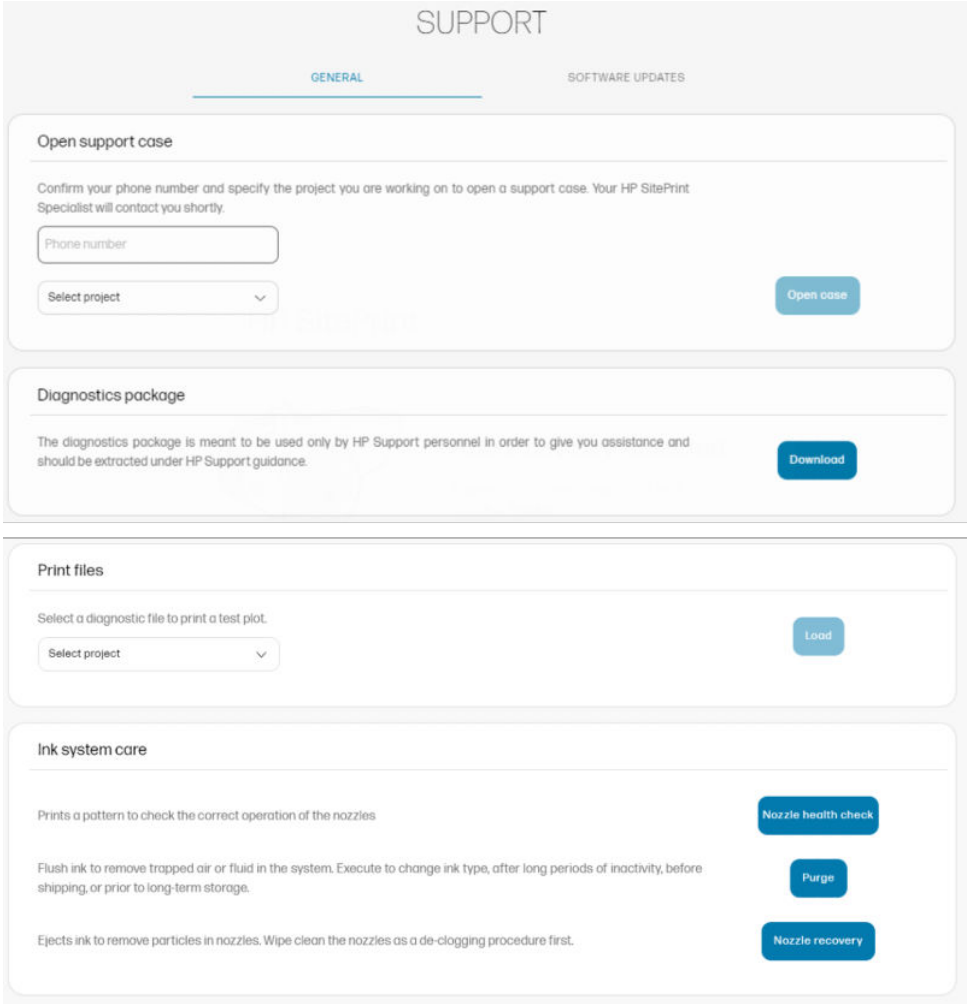
This section provides general support options and support for software updates.

General

From the **GENERAL** tab, you can:

- **Open support case** to get assistance from a HP SitePrint Robot specialist.

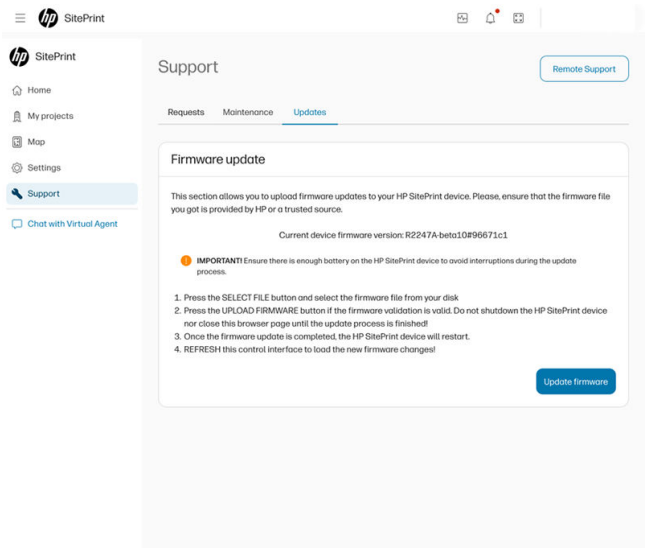
- Download the **Diagnostic Package**. In case of an issue with the robot, HP support can request it. It is downloaded on the computer and can be shared to troubleshoot problems remotely.
- **Print files**: Select a diagnostic file to print a test plot.
- **Ink system care**:
  - **Nozzle health check**: Prints a pattern to check the correct operation of the nozzles.
  - **Purge**: Flush ink to remove trapped air or fluid in the system. Use to initiate a change in ink type, after long periods of inactivity, before shipping, or prior to long-term storage.
  - **Nozzle recovery**: Eject ink to remove particles in the nozzles. Wipe the nozzles first to assist in the de-clogging and/or cleaning.



Software updates

From the **SOFTWARE UPDATES** tab, you can:

- Check the current device software version.
- Check whether there are new software releases, download and install them.



IMPORTANT: When downloading a new firmware version, from the Cloud, HP recommends a connection of at least 3 Mbps.

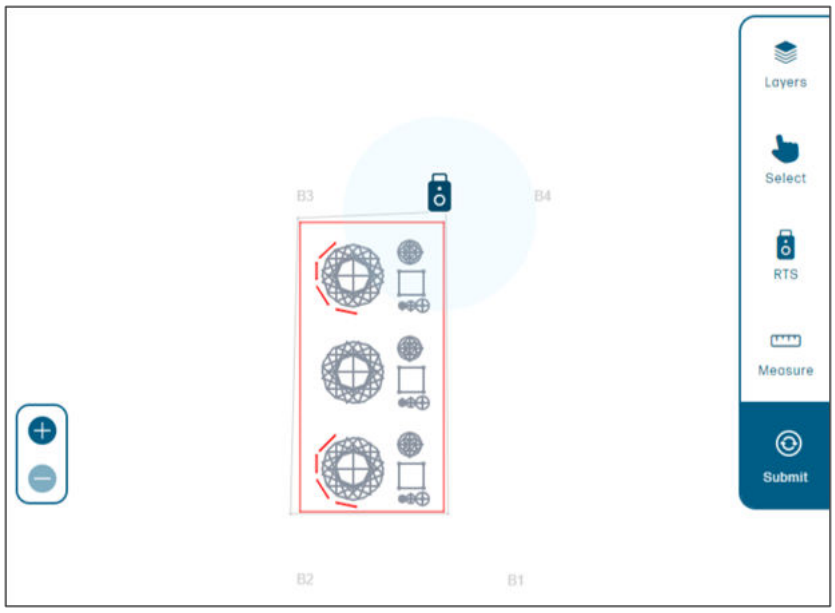
Map

The Map page is where the main layout actions happen.

The chosen drawing is displayed, and the tools menu allows you to perform various actions:

1. Choose which layers are shown on the map, besides the three mandatory ones (explained in the previous module).
2. Select the lines to be printed.
3. Select the stationing method: to a line or resection.
4. Add obstacles that were not on the original CAD.
5. Measure distances for reference or to add obstacles.
6. Process the DXF file.

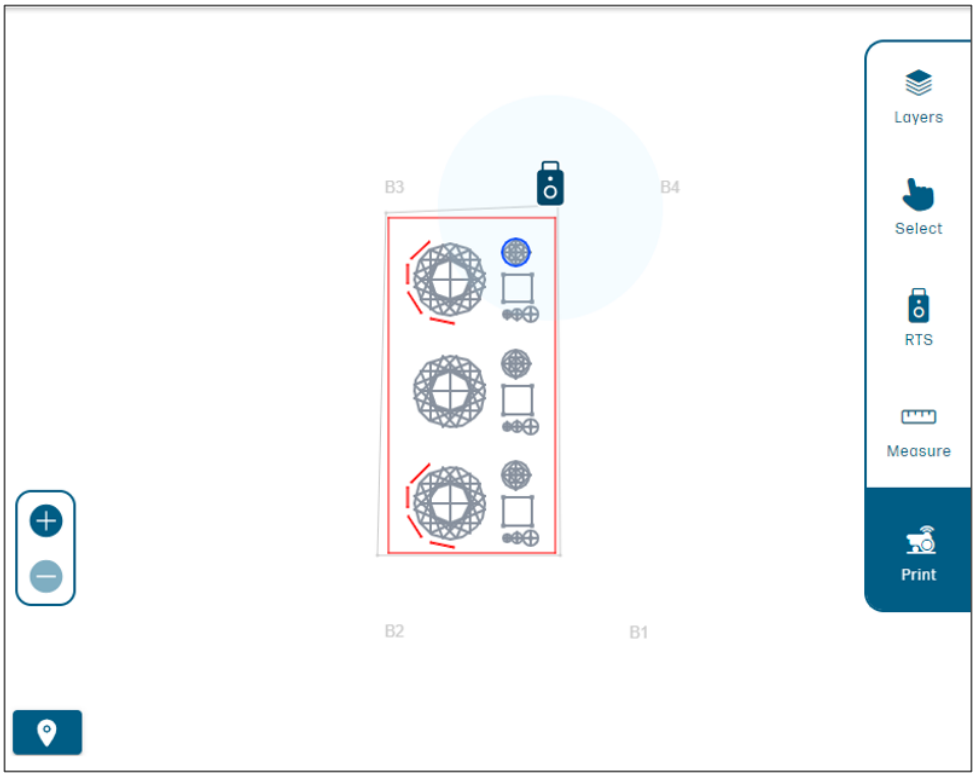
7. Check the recommended exclusion zone, around the RTS, to ensure accuracy.



NOTE: It is highly recommended to add all the obstacles before you start printing, otherwise the job progress will be lost if more obstacles are added later.

Job submission

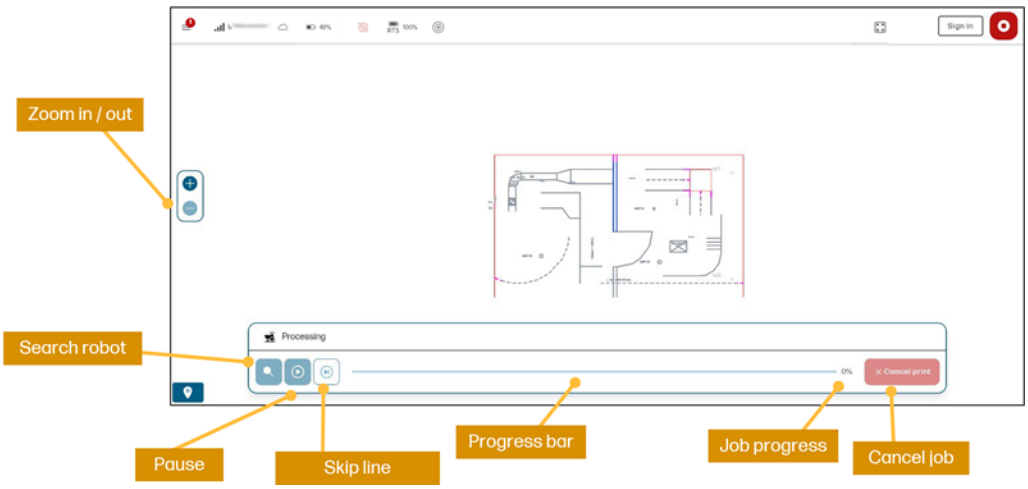
After submitting the job, it is processed by the robot. Then you will be able to select the lines and print them. Selected lines are colored in blue, and obstacles in red.



IMPORTANT: During this process, obstacle avoidance is not enabled, so make sure to leave at least 1 m (3.2 ft) until the calibration is finished.

After the file is processed, you can start printing.

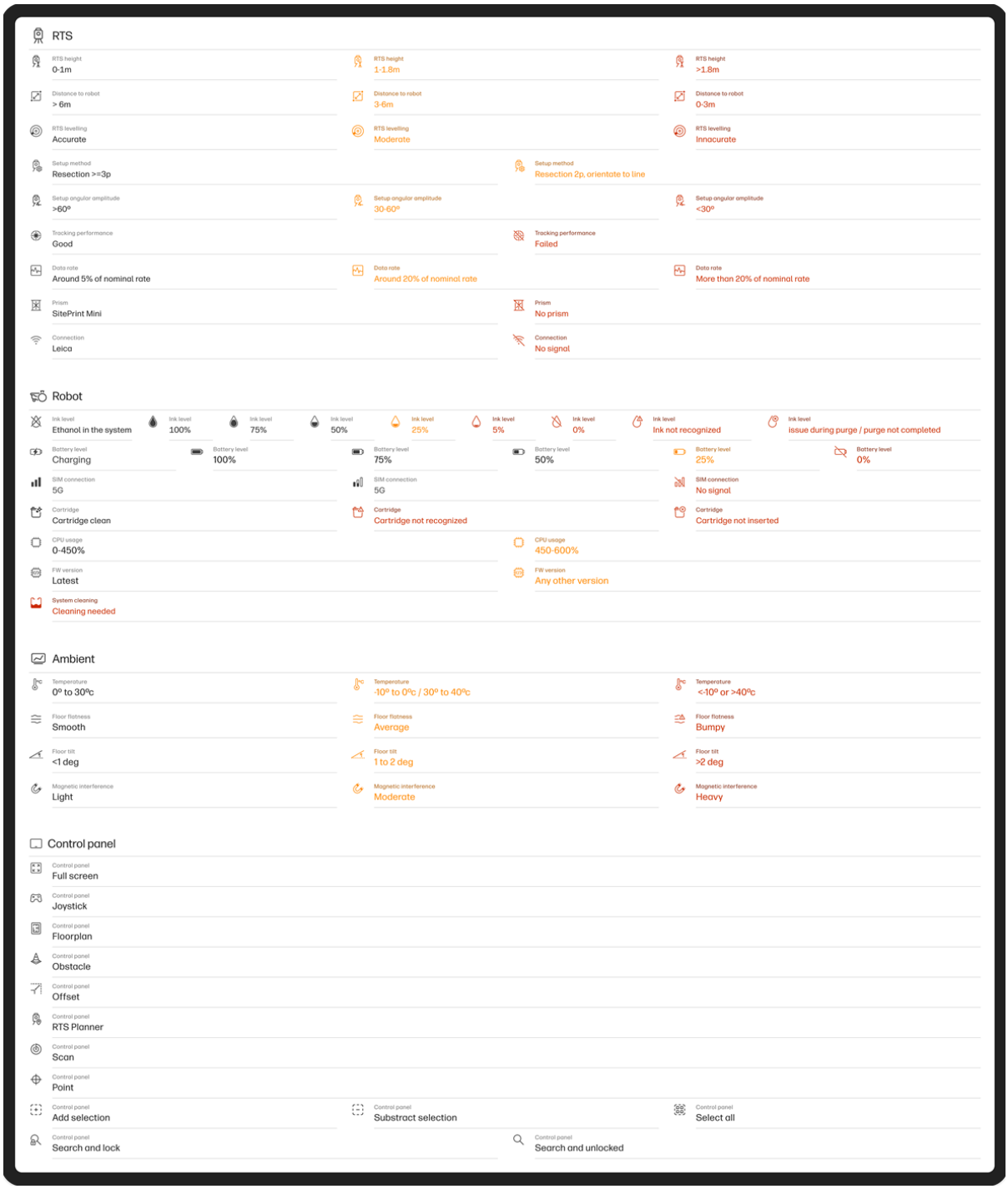
- Green lines show what has been successfully printed.
- Flashing line shows what will be printed next.
- Orange lines will appear if the line fails to print.
- Pink lines appear if an obstacle is closer than allowed to print. Those are discarded by the UI.



User-interface symbols

In the top bar and elsewhere in the user interface, various icons are displayed that reflect the actions that can be taken or the status of the solution.

The following chart shows the main icons in use.



Accuracy dashboard

With the release of Value Pack 2.2, the control panel will include a dashboard that displays the status of various indicators relevant to the overall accuracy of the system.

The purpose of this dashboard is to alert users to any factors that could influence the accuracy of their jobs.

Each indicator has three statuses: excellent, fair, or poor.

Not all indicators contribute equally to the overall accuracy of the system. When the status of a critical indicator deteriorates, notifications will be triggered.

If an indicator status is not excellent, that does not necessarily mean that the job cannot be performed within the accuracy specifications.

However, it is helpful to alert the user when any status is not excellent, as taking simple actions to improve the indicator can benefit the overall accuracy of the job.

By collecting the different statuses of all indicators and considering their corresponding weight in terms of the impact each metric can have on the overall accuracy of the system, the system can display an overall accuracy status.

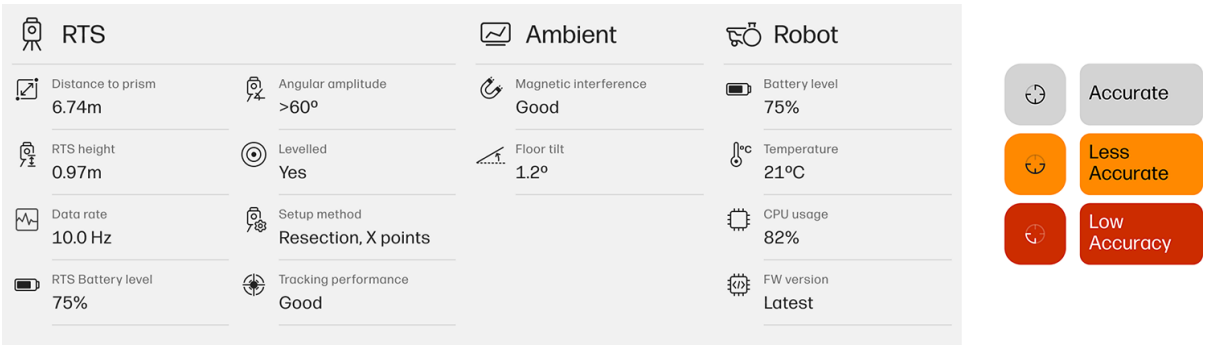


Table 2-2 Robotic Total Station indicators

Indicator	Description	Poor (red)	Fair (yellow)	Excellent (black)	Actions
Distance to prism	Indicates the distance between the RTS and the tracked prism.	0–3 m (0–9.8 ft)	3–6 m (9.8–19.7 ft)	> 6 m (19.7 ft)	Positioning the robot too close to the RTS can affect accuracy. Always ensure the RTS is set at least 6 m (19.7 ft) away from the print area. If you cannot move the station further away, put it as low as possible on the tripod.
Data rate	Shows the frequency of RTS measurements sent to the robot, highlighting deviations from the RTS nominal frequency.	±20% versus nominal frequency	±8% versus nominal frequency	Nominal frequency	If this indicator displays red or yellow, the RTS may lack necessary configurations for the appropriate refresh rate or could be malfunctioning. Contact your HP SitePrint specialist.
Setup angular amplitude	Tracks setup quality by measuring the angular amplitude of the control points used for RTS setup.	< 30°	30°–60°	> 60°	Always perform your RTS setup using best practices and maximize the angular amplitude.

Table 2-2 **Robotic Total Station indicators (continued)**

Indicator	Description	Poor (red)	Fair (yellow)	Excellent (black)	Actions
Setup method 	Indicates the setup method used and the number of measured points.	N/A	Orientation to line, or resection (2 p.)	Resection (> 2 p.)	To maximize accuracy, resection setup is recommended, as it allows for quality checks of the measured control points. Using at least three points enhances quality control.
RTS height 	Provides an estimated elevation of the RTS above the floor. This indicator is shown after tracking the robot within a 5 m² (53.8 ft²) area on a flat surface (tilt below 0.5°).	> 1.8 m (5.9 ft)	1–1.8 m (3.3–5.9 ft)	< 1 m (3.3 ft)	Position the RTS at the lowest feasible height to minimize steep vertical angles during robot prism measurements.
RTS battery level 	Indicates the current RTS battery level.	< 5%	5–40%	> 40%	Internal testing suggests that RTS performance for this application may be compromised in low battery mode. To achieve optimal results, avoid operating the instrument with a low battery level.
RTS leveling 	Indicates the leveling status of the RTS.	> 0.0675°	0.00567°–0.0675°	< 0.00576°	If the leveling indicator is not correct, level the instrument using the electronic level when possible. Check that the tripod is in good condition or use a tripod stabilizer if required.
Tracking performance 	Measures the dispersion of samples received from the RTS, to identify inaccurate measurements.	σ > 5 mm	σ 3–5 mm	σ < 3 mm	High dispersion in RTS measurements may be a consequence of the poor status of other indicators. Check the status of the other indicators and address any issues if possible. This should enhance the device's tracking performance.

Table 2-3 **Ambient indicators**

Indicator	Description	Poor (red)	Fair (yellow)	Excellent (black)	Actions
Floor tilt 	Indicates the inclination of the floor on which the robot is functioning.	> 2°	1°–2°	< 1°	While ambient conditions cannot be altered by the user, these indicators serve to determine whether the robot's operating conditions are optimal or not.
Magnetic interference 	Indicates the level of magnetic interference, as determined by the measured drift in the inertial measurement unit.	> 1°/min	0.5–1°/min	< 0.5°/min	While ambient conditions cannot be altered by the user, these indicators serve to determine whether the robot's operating conditions are optimal or not.

Table 2-4 **Robot indicators**

Indicator	Description	Poor (red)	Fair (yellow)	Excellent (black)	Actions
Battery level 	Indicates the current robot battery level.	< 20%	20–40%	> 40%	Avoid operating the instrument with a low battery level.
CPU usage 	Displays the level of stress on the robot's CPU, providing insight into its processing capacity and performance.	> 100%	75–100%	< 75%	If the CPU usage is consistently above 75% for no apparent reason, contact your HP SitePrint specialist for further assistance.
Temperature 	Measures the robot's internal temperature.	< –10°C or > 60°C (< 14°F or > 140°F)	–10 to –5°C or 55 to 60°C (14 to 23°F or 131 to 140°F)	–5 to 55°C (23 to 131°F)	Extreme temperatures, both high and low, within the robot can adversely impact its printing performance.
Firmware version 	Indicates the firmware version running in the robot.	N/A	Update available	No update available	HP recommends you to use the most up-to-date firmware version available. If a firmware update is available, the indicator will display yellow.

HP SitePrintCloud

The following section provides detail on this topic.

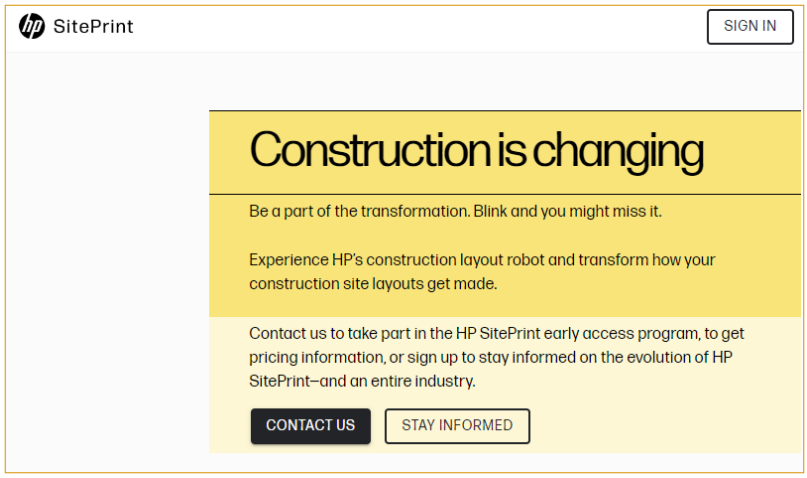
You can find it at https://siteprint.hp.com.

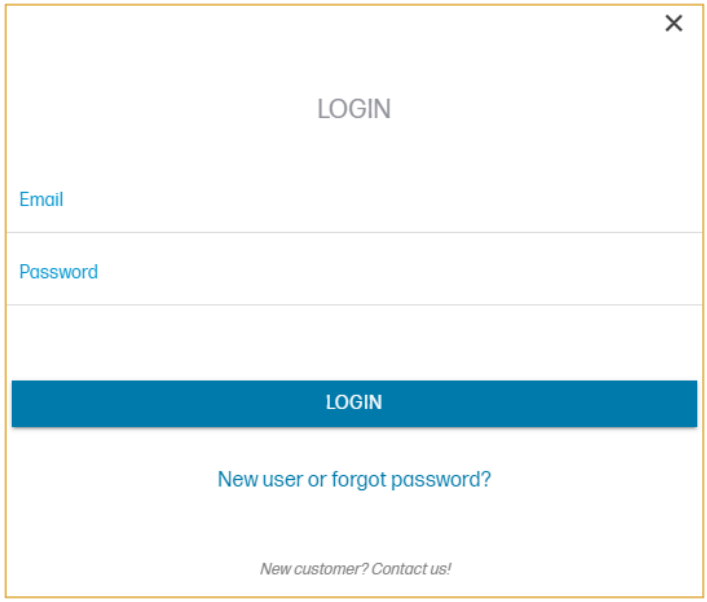
Once you have your robot, you will receive an email invitation to join the HP SitePrint Cloud; you can then log in or create your HPID account.

How to access

Always perform the steps in the order presented.

1. The DXF files must be previously loaded to the Cloud before going to the layout area.
2. To Access the HP SitePrint Cloud go to the following website: https://siteprint.hp.com/.
3. Press **Sign In** to login into your account or create a new one.

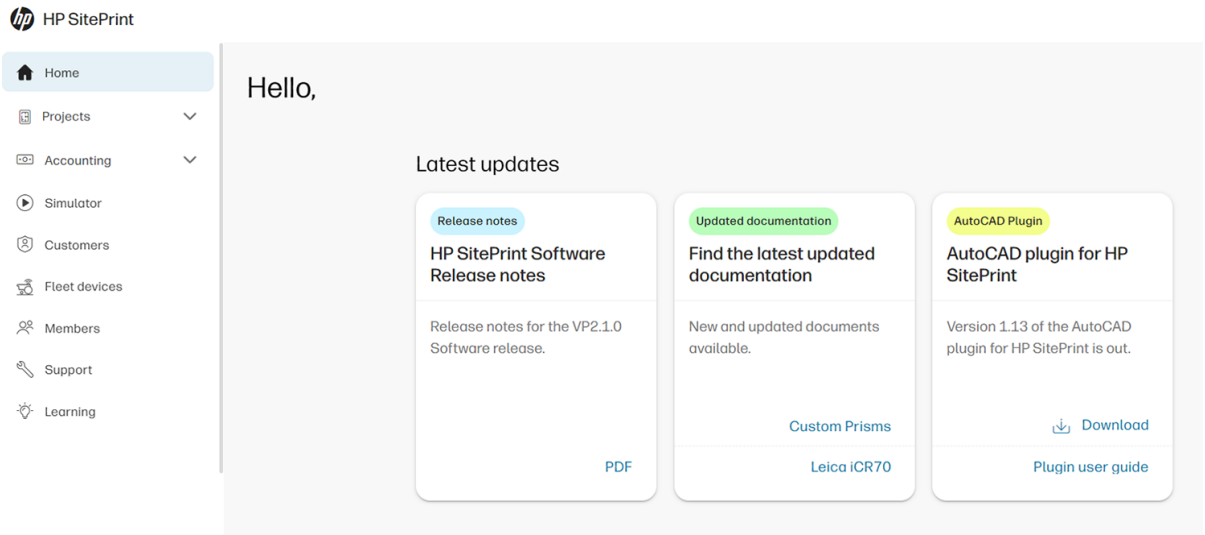




Home

From the Home page, you can download the latest AutoCAD plugin and its user guide.

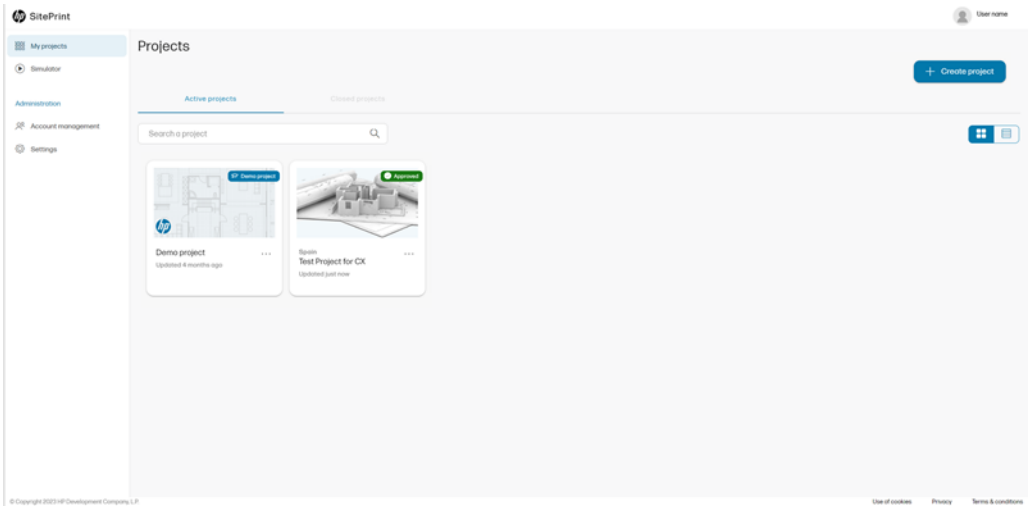
Additionally, you can check the latest updates from the HP SitePrint Robot.



My projects

From the My projects tab, you can upload a DXF file to the cloud.

1. Go to the **My projects** tab.
2. Create a project or open an existing one.
3. Upload a document from your computer or upload a new version to an existing project.

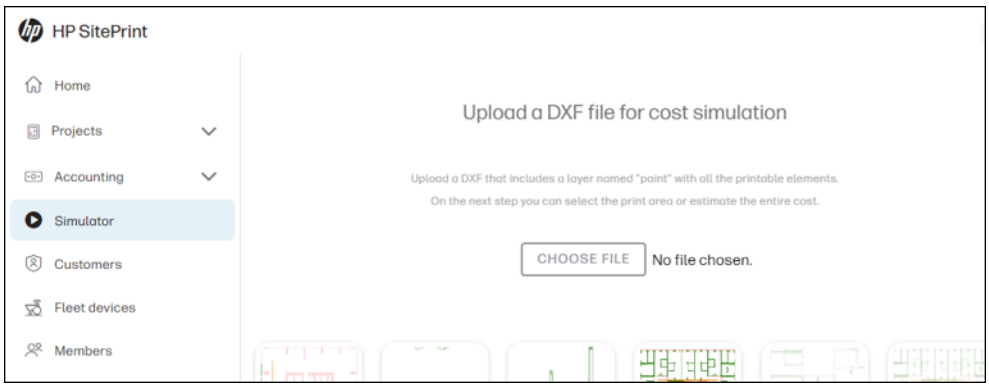


4. Following this, you can go back to the robot's user interface and **My projects**, and select the DXF you want to print by clicking the name of the file.

   You can download the file or upload a new version by clicking the three menu buttons to the right of the file's card.

Simulator

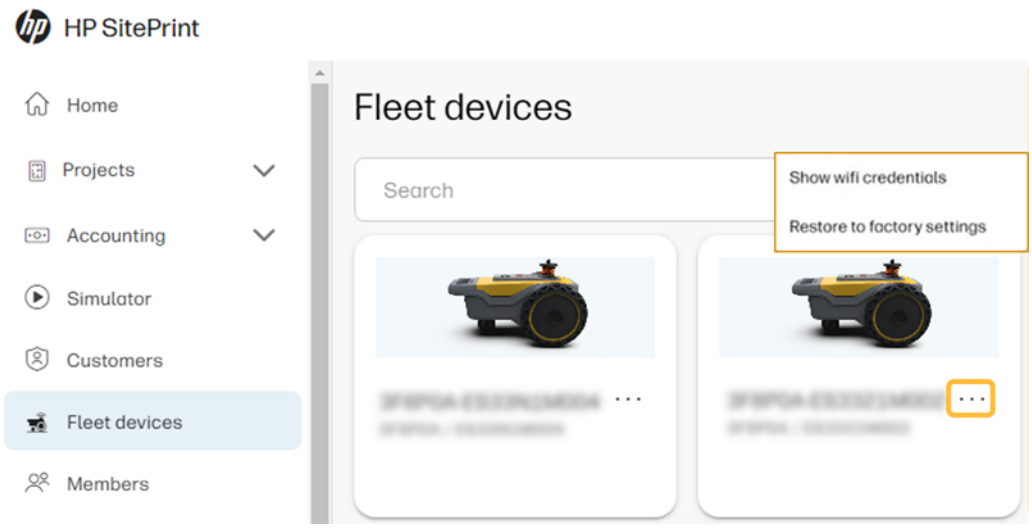
From the simulator tab you can select a DXF file to get a rough estimate of the job distance, covered area, and execution time.



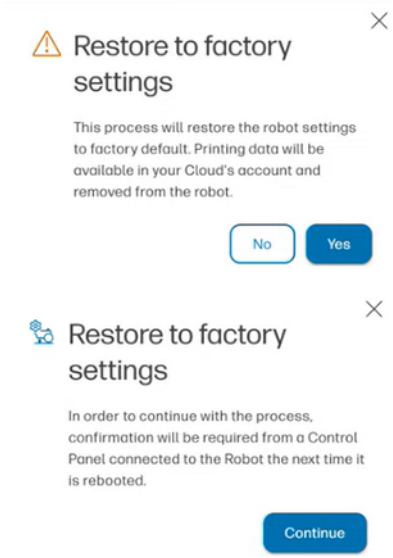
Fleet devices

From the Fleet devices tab, you can check the robots that are assigned to your account.

1. Select the three dots next to each unit to see the Wi-Fi credentials, or reset the robot to factory settings.

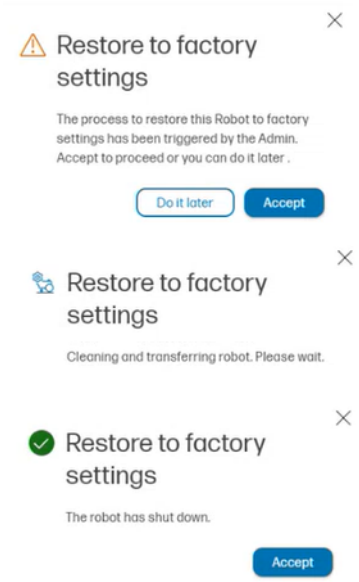


2. Follow the steps to restore the robot to factory settings.



3. If the robot is on, a popup will appear for you to accept.

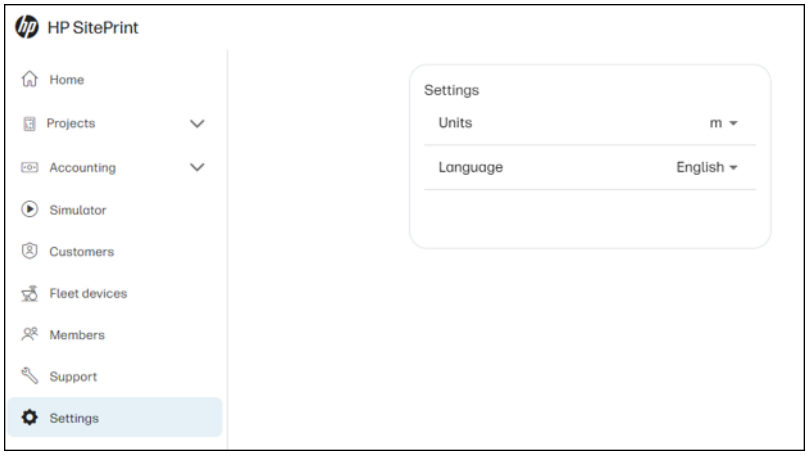
   If the robot is off, a registration popup will appear when it is turned on.



   Once the restore process is done, the robot will disappear from your cloud account, and it will be necessary to register it again.

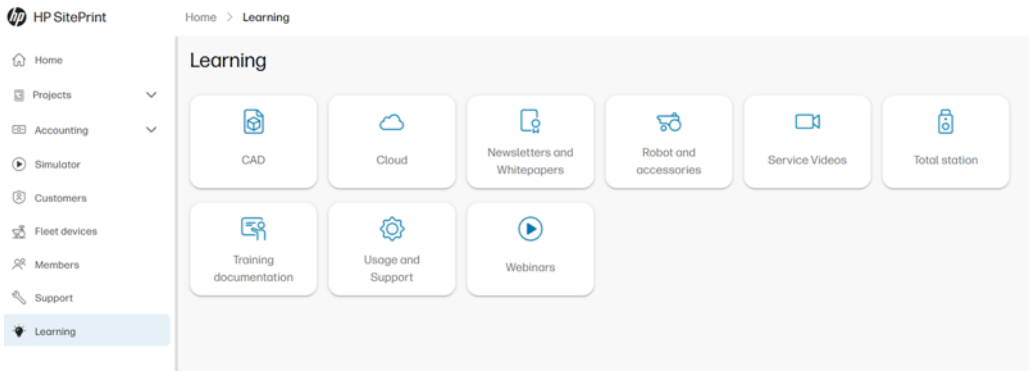
Cloud settings

From the Settings tab, you can change the language and the units used in the HP SitePrint Cloud website.



Learning

From the Learning tab, you can download all the documents available for the HP SitePrint Robot.



RTS models and mini-prisms

Various different RTS models are compatible with HP SitePrint.

You can download instructions on how to set up and use each specific model from https://siteprint.hp.com/app/learningwebsite,insidetheTotalStationcategory.

Table 2-5 RTS models and mini-prisms

RTS	Recommended prism	Compatible prism	Compatible prism
Leica TS16	Leica MPR122	Leica GRZ101	HP SitePrint
			

Table 2-5 RTS models and mini-prisms (continued)

RTS	Recommended prism	Compatible prism	Compatible prism
Leica iCON iCR70/80 	Leica MPR122 	Leica GRZ101 	HP SitePrint 
Topcon LN-150 	HP SitePrint 	Leica GRZ101 	
Trimble RTS573 	HP SitePrint 	Leica GRZ101 	
Trimble S9 	HP SitePrint 	Leica GRZ101 	

The Leica GRZ101 and HP SitePrint mini-prisms require the use of the adapter.

Remote control

You can use the remote control to operate the robot from a distance. It can be used from up to 50 m (164 ft) away.

Each remote control operates one particular robot, whose ID is shown on a sticker underneath the remote control.

Use of the remote control

Introducing the various buttons and features of the remote control.

1. The switch must be set to Bluetooth position (right). To prevent battery drain, switch it back to USB position (left) to turn off the controller before storing it in the suitcase.
2. Press the home button to connect to the robot.
3. Press the blue X button to turn the manual ink-firing system on or off.
4. Press the green A button to put the robot into manual mode.
5. Hold the L1 button to move the robot while using the joysticks as needed.
6. The left joystick moves the robot backwards and forwards. The right joystick steers it left to right.
7. Press the SELECT button to recover from stopping at an obstacle.

The controller is used to control the robot manually to ease movement between areas, to position it to start a job, or to help it to avoid an obstacle.

To enable manual control:

1. Make sure the controller is on. Set the switch on the bottom of the controller to Bluetooth position (right).
2. Connect the controller to the robot. Use the home button in the center of the controller. Lights on the controller will start blinking. They should be on permanently once connected.
3. Press the A button to enable manual control. Make sure a red pilot light appears at the front of the robot.
4. Hold L1 to start moving the robot. Use the joysticks to move and steer it.

To recover control after safety sensor activation:

1. Make sure the red pilot light is on (manual control is enabled). If not, press the A button.
2. Press the SELECT button to reset the sensor.
3. Try to move the robot using the joystick by holding the L1 button and steering it.

If the robot is not responding, make sure all four safety sensors are visible and pointing towards a flat, non-reflective surface. Shiny or extremely dark surfaces could cause the sensors to activate.

If none of these actions are successful in restoring the movement, press the RT button to reset the electronics and try again.

NOTE: The controller will go into sleep mode after several minutes of inactivity. To turn on the controller, press the home button and check that the lights are on.

NOTE: Before storing the controller back in the suitcase, make sure the switch is in USB position (left) to avoid the battery draining.

NOTE: Each remote control is unique to a particular robot. They cannot be used interchangeably.

3 Prepare to print

Prepare a CAD file

To prepare an AutoCAD DXF file for printing, see the plugin user guide.

The plugin user guide is available from the cloud webpage, https://siteprint.hp.com/app/home.

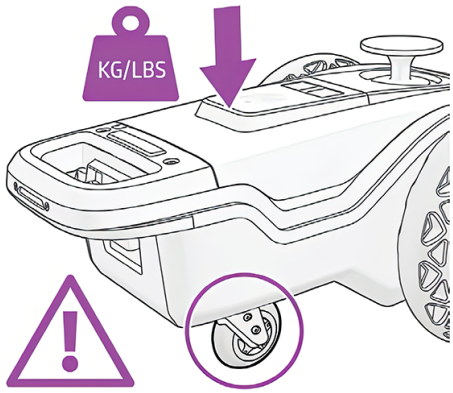
Site preparation

Bear in mind that the conditions at the worksite play a crucial role in the success of a job.

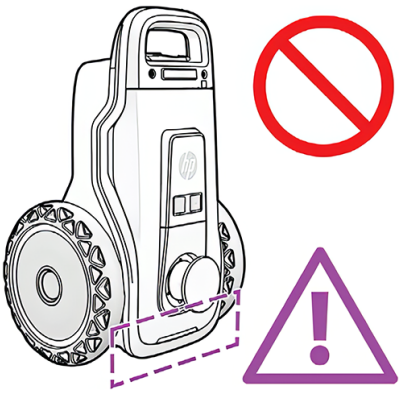
Ensure that the robot is used under the following conditions:

- Do not store any materials in the layout area.
- Cover any holes into which the robot could fall, or in which its wheels could get stuck.
- Avoid dark or black surfaces or areas with water spots, as they may cause reflections that could trigger the safety sensors and stop the robot.
- Do not use the robot in temperatures above 40°C (104°F) or below –10°C (14°F).
- Do not use the robot in heavy rain or extremely dusty environments.
- The robot's recommended maximum distance from the total robotic station, without obstacles, ensuring the same level of accuracy across the printed area is 91 m (300 ft).
- The robot's recommended minimum distance from the total robotic station, without obstacles, ensuring the same level of accuracy across the printed area is 5 m (16.4 ft).

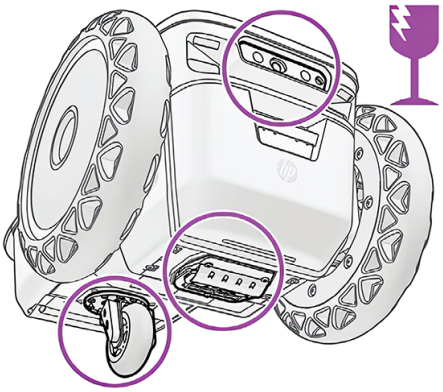
Prepare the robot



⚠ **CAUTION:** Do not lean on the robot when manipulating it: the caster wheel might break.



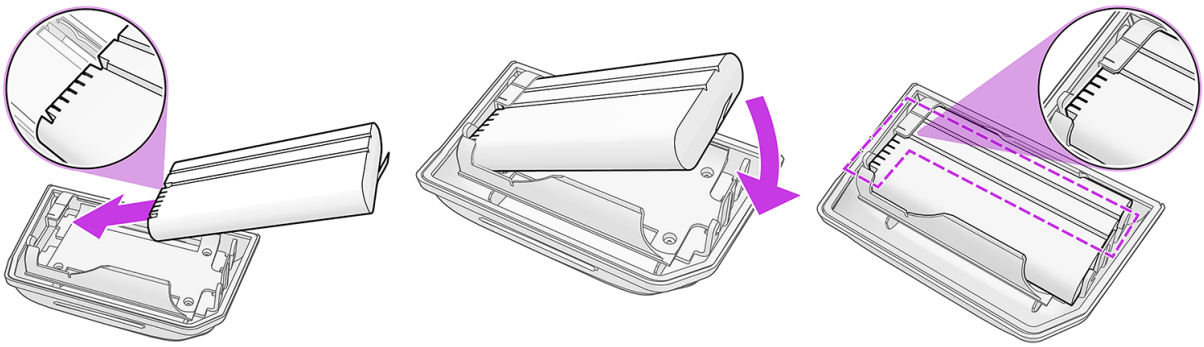
⚠ **CAUTION:** Do not place the robot vertically: it might fall.



⚠ **CAUTION:** Bear in mind that the fragile areas of the robot are the caster wheel, the printhead, and the front sensors. Handle the robot with care to protect them.

Insert the battery

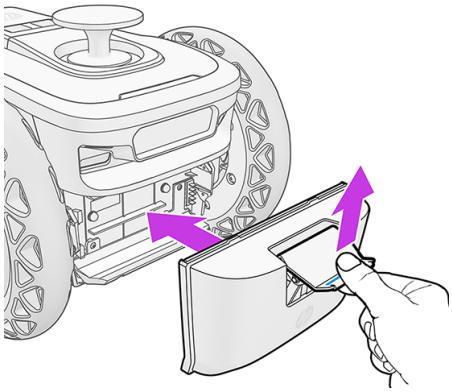
How to insert the battery into the robot.



- Take the battery holder and a charged battery.

TIP: Make sure that the battery is charged.

- Locate the pins in the battery, and place them into the corresponding holes in the battery holder.
- Two parallel grooves should remain visible during the process.
- Place the battery holder and battery into the robot, keeping the latch pressed with your thumb. Hold the robot by the rear handle or by the wheel while locking the battery holder into place.



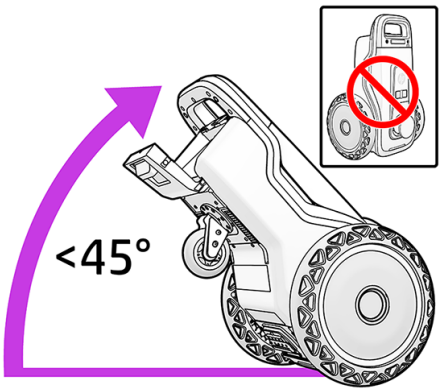
Recommendations

- Battery will last about 4 hours, consider recharging it before projects.
- Replace the battery at 20% of charge for optimal accuracy and control.
- Battery cover may be difficult to close, the latches can deform slightly, handle with care if it is difficult to open or close.

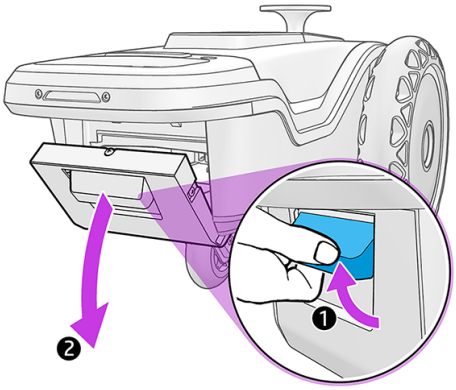
Insert the ink cartridge

To insert the ink cartridge, the robot should be horizontal, or rotated by up to 45°.

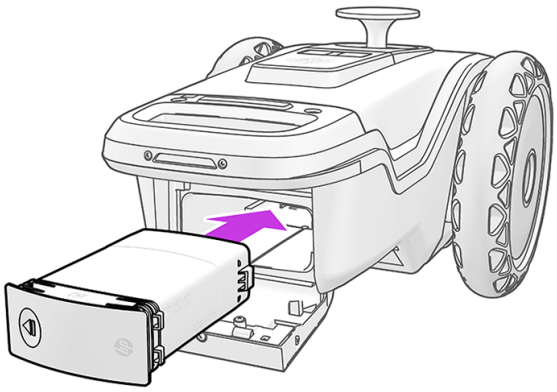
⚠ CAUTION: Do not rotate the robot by more than 45°, which could damage the sensors.



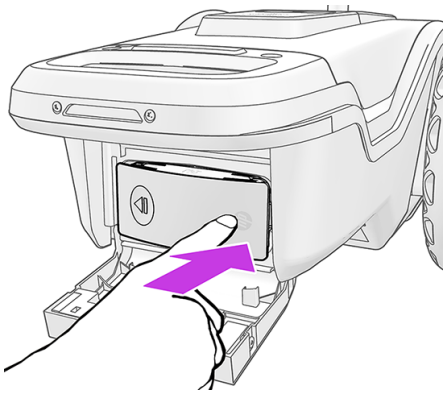
1. Open the door.



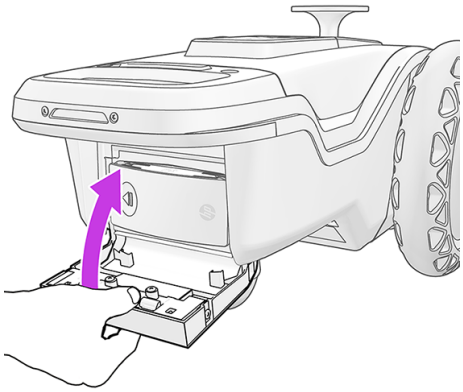
2. Insert an ink cartridge.



3. Press to the right to lock the cartridge in place.



4. Make sure the ink supply is fully inserted, and close the door. You should feel a click as the door closes.



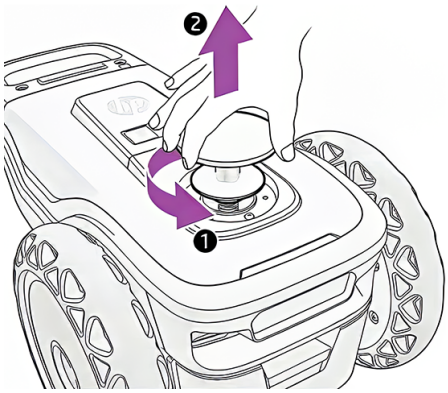
IMPORTANT: When replacing an ink cartridge for another one of different type or color, first insert a cleaning-fluid cartridge, even if the user interface does not request it.

HP recommends storing HP SitePrint supplies at a temperature above 0°C (32°F).

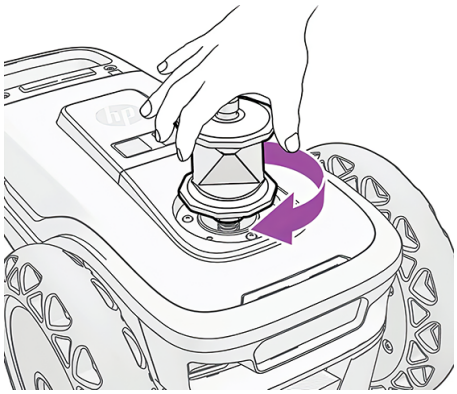
Insert the prism

Take the following steps to insert the prism.

1. Remove the extraction handle from the robot.



2. Insert the 360° prism and rotate it to secure it in place.



The handle can be stored in the prism slot in the suitcase.

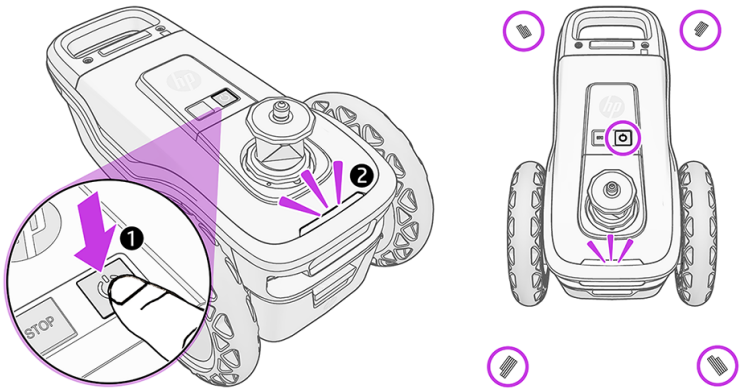
4 Job execution

Once you have set up your RTS, and secured a connection between the RTS and the control panel, you are ready to start printing.

Turn on the robot

Turn on the robot by pressing the power button on top, and wait for the LEDs to turn white. This could take up to 2 minutes.

TIP: The robot should be on a surface that is even, clear, and not reflective.



You should see four LEDs light up at the front and rear of the robot.

If the LEDs turn orange or red, use the power button to restart.

Turn on the control-panel device

Turn on the tablet or other device that you use to run the control-panel software.

Connect to the robot's Wi-Fi

You can find the Wi-Fi name and password of the robot by scanning the QR code on the back of the assembly instructions, or on the back of the remote control.

The Wi-Fi name is the same as the robot's serial number, which you can find on the label beside the printhead.

Access the control panel

1. Access the control panel from the Chrome browser by navigating to http://192.168.10.1.

NOTICE: Only the Google Chrome browser is supported.

TIP: Create a shortcut on your desktop to enable easier access and full-screen view.

2. Check that network-provider connectivity type and signal level is displayed on the top bar.
3. If you see the message **Starting up**, restart your tablet (or other control-panel device).
4. For normal use of the control panel, set Chrome to **Full screen** display.

Prepare the RTS

The Robotic Total Station requires some setup before use.

Preliminary considerations

- Check that the RTS has software and licenses suitable for use with the HP SitePrint Robot .
- Take some time to plan the job, keeping in mind the drawing, the printing area, the position of the reference targets, and visibility. This will probably save time overall.
- HP highly recommends placing the RTS at a position with visibility of at least three control points.
- HP also recommends that the control points are further from the RTS than the printing area.
- If possible, choose control points that form angles of around 60° from the position of the RTS.
- When aiming at a reflective tape target, avoid angles of less than 45° between the visual and the target plane.

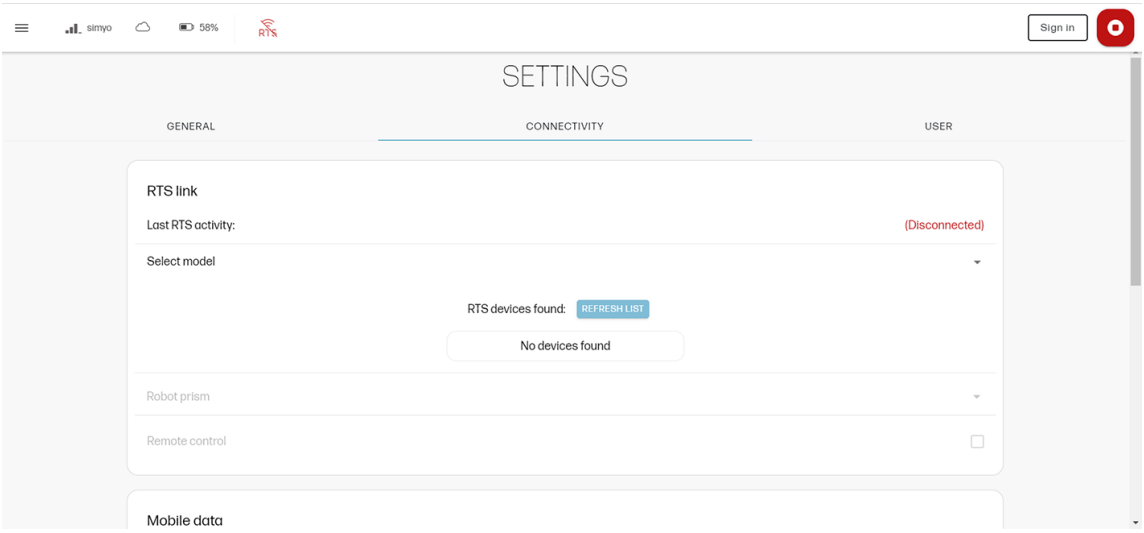
1. Turn on the RTS.
2. Level the RTS in whatever way is required by that particular model.

   See the RTS documentation, which you can download from https://siteprint.hp.com/app/learningwebsite, in the Total Station category.
3. For a setup from the RTS by resection, enter the control points into the internal memory first.
4. Set up the RTS by resection or orientation to a line using the user-interface tools or your RTS.
5. When you are ready, aim the prism approximately, tap **Scan**, then lock the prism.

Set up communication between robot and RTS

The robot and the RTS need to communicate with each other.

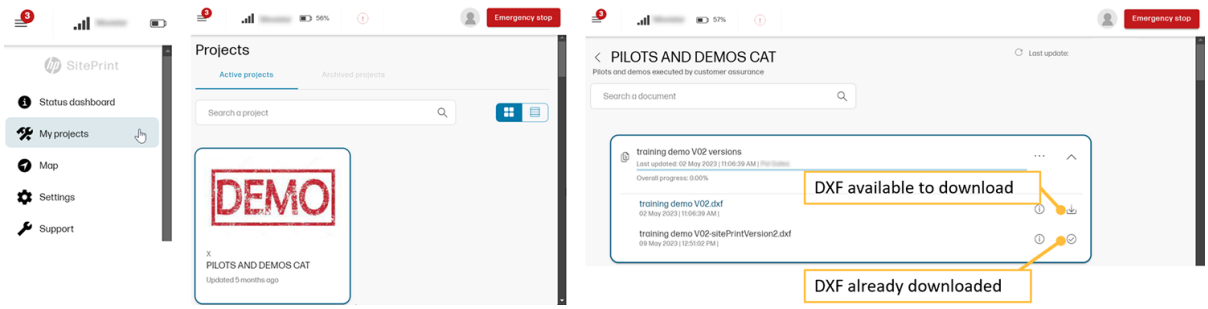
1. Go to the **Connectivity** tab of the **Settings** page in the control panel.



2. Tap **REFRESH LIST** to detect a nearby RTS and connect to it.

Load a file from My Projects

From the **My Projects** tab, you can choose the project that contains the DXF file that you want to print from the HP SitePrint Cloud.

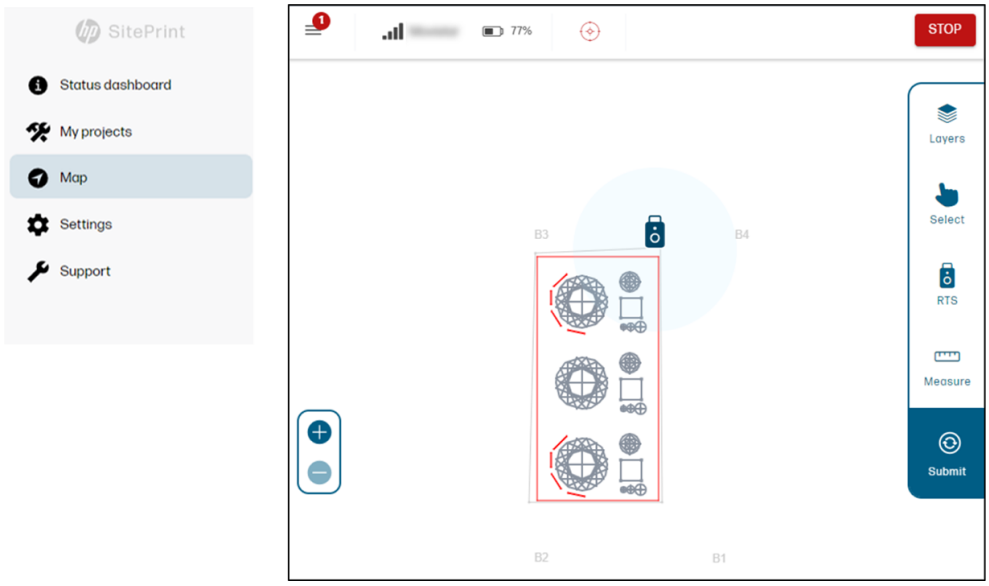


You can also download a DXF file from the Cloud to work offline. If you previously downloaded the file, when you are in an area without coverage, the robot can work with that file without needing to connect to the Internet.

Map page

The Map page is used to submit jobs and control their progress.

The maximum submitted print area is 300 × 300 m (984 × 984 ft).



Various editing and other actions can be performed from the Map page.

Table 4-1 Map icons

Icon	Action
Layers	Choose which layers are shown on the map, besides the three mandatory ones already explained.
Select	Select the lines to be printed.
RTS	Select the stationing method: to a line or resection.
Edit	Add obstacles that were not in the original DXF file.
Measure	Measure distances for reference or to add obstacles.
Submit	Process the DXF file.

Table 4-1 Map icons (continued)

Icon	Action
	Check the recommended exclusion zone around the RTS, to ensure accuracy.

TIP: Add all the obstacles before you start printing: the job progress will be lost if more obstacles are added later.

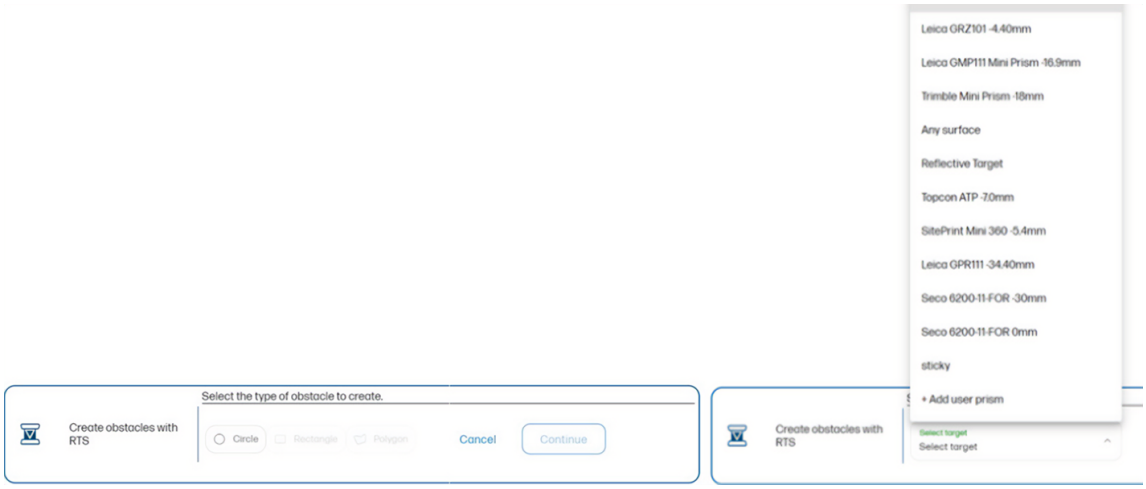
Add obstacles

Using the edit function, you can add obstacles that do not appear in the DXF file.

Two methods are available:

- **On screen:** You can add obstacles by tapping the map. You can also resize, move, rotate (using the corners), and delete obstacles.

- **With the RTS:** You can add an obstacle by pointing the RTS directly at the physical location where you want to add it. You can choose between making a circle, a rectangle, or a polygon by selecting the correct prism.

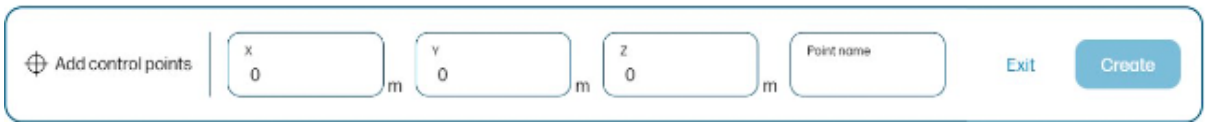


TIP: Add all obstacles before starting to print: the job progress will be lost if obstacles are added once printing has started.

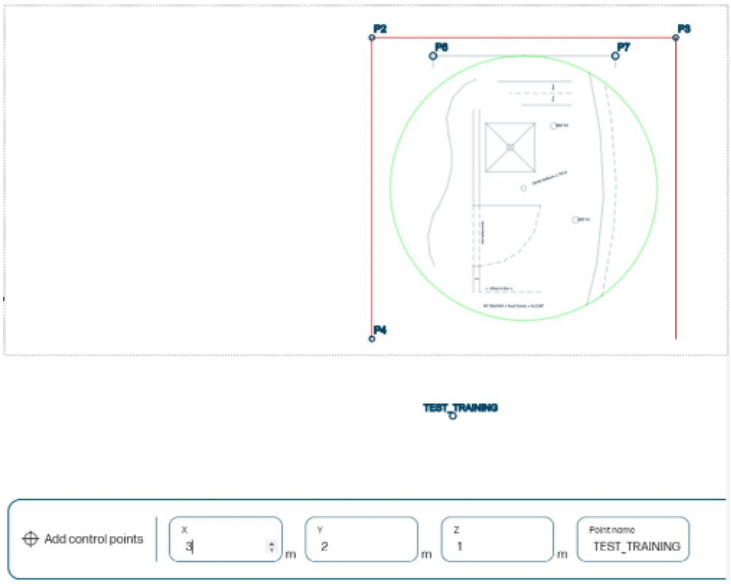
Add control points

You can add control points from the Map page without having to add them previously in the DXF file.

You need to enter the X, Y, and Z coordinates of the point, and assign a name to it.

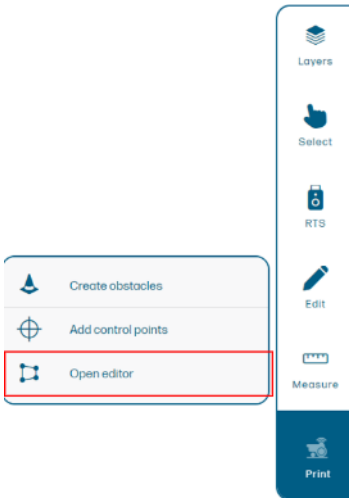


The same units of measurement are used as in the DXF file.

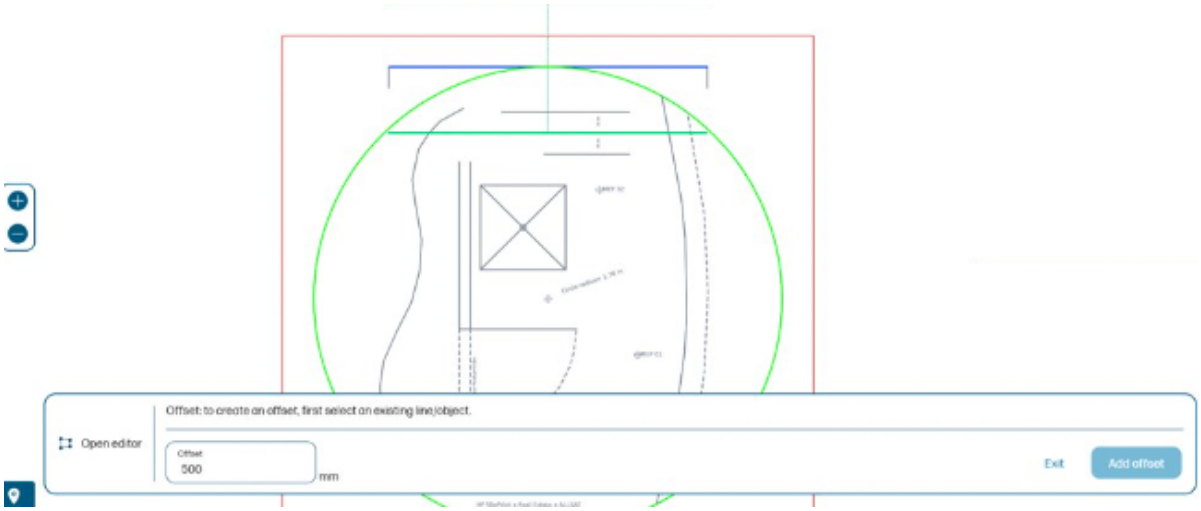


Open editor offset

You can add an offset to any element in a DXF file by using the Open Editor option on the Map page.

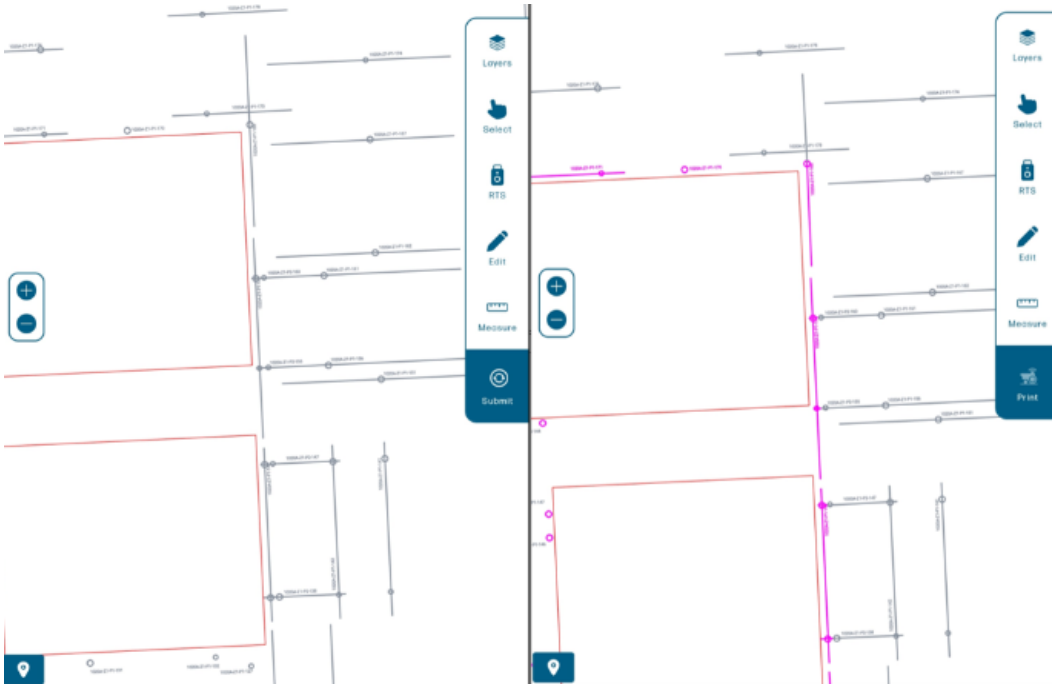


To create an offset, select an existing line or object, then assign the offset value.



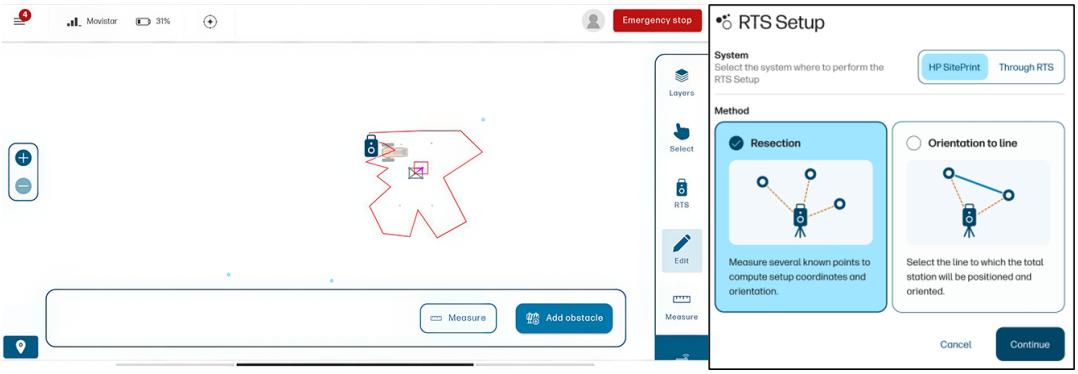
When you submit the job, it is processed by the robot.

At that time, any elements that are 20 cm7.8 in or less from any obstacle are discarded or segmented. Such elements are displayed in pink and moved to the 'discarded' layer.



Station the RTS

From the Map page, you can station the RTS in two different ways: resection or orientation to a line.



You can also choose between doing the RTS setup from the control panel or from the RTS screen when needed, or **Load a previous setup** if you have already set up your RTS.

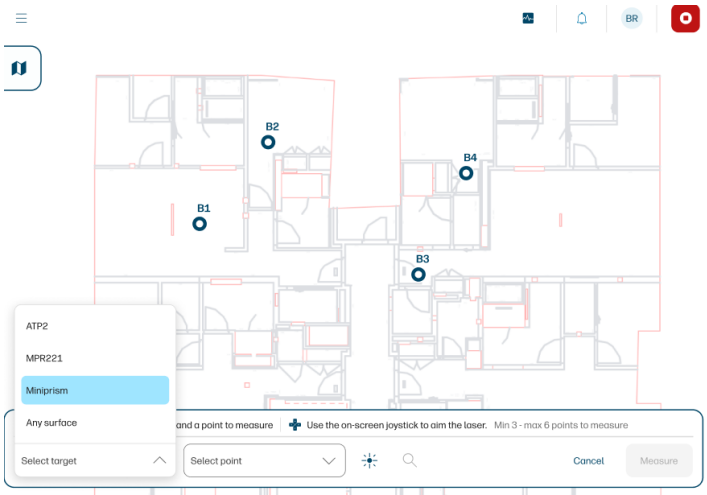
Recommendations during setup

- Always set up your RTS at least 5 m (16 ft) away from the layout area.
- Setting up the RTS no higher than 1.2 m (4 ft) will increase its accuracy.
- Ensure it is properly leveled before starting the setup workflow.
- HP recommends using the resection setup method. If that is not feasible, you can use the orientation-to-a-line method (if available).
- Do not forget to raise the RTS antenna (if available) to increase the communication range.
- Before every measurement, make sure you have selected the right target type from the list.
- Check the user-interface settings to ensure that the RTS is connected to the robot.
- Level the RTS accurately, and check it now and then.

Resection

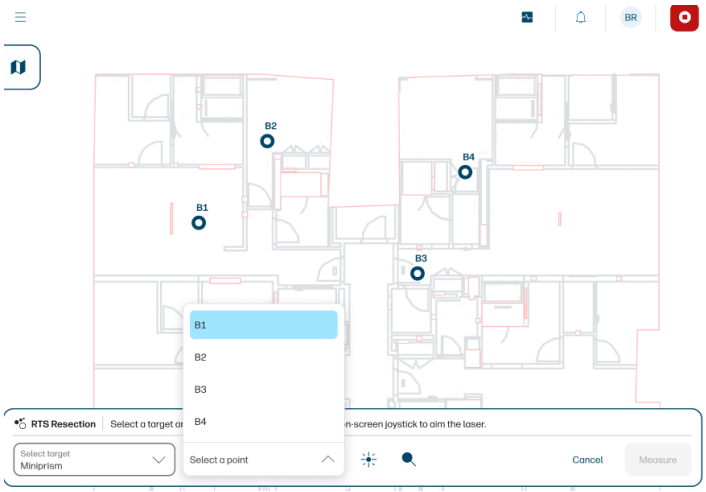
If you selected the resection method, follow these steps.

1. Select a target type from the list.



2. Select a control point from the list, or in the map, and aim the RTS approximately at that target.

NOTE: Your drawing must have defined control points to carry out this process.

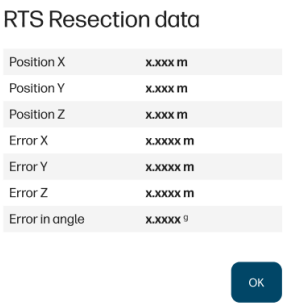


3. Before tapping **Measure**, tap the search icon to make sure that the RTS has locked the prism, or ensure a good aim manually.

4. Tap **Measure**, and repeat these steps with two or more other control points.

5. Tap **Finish**.

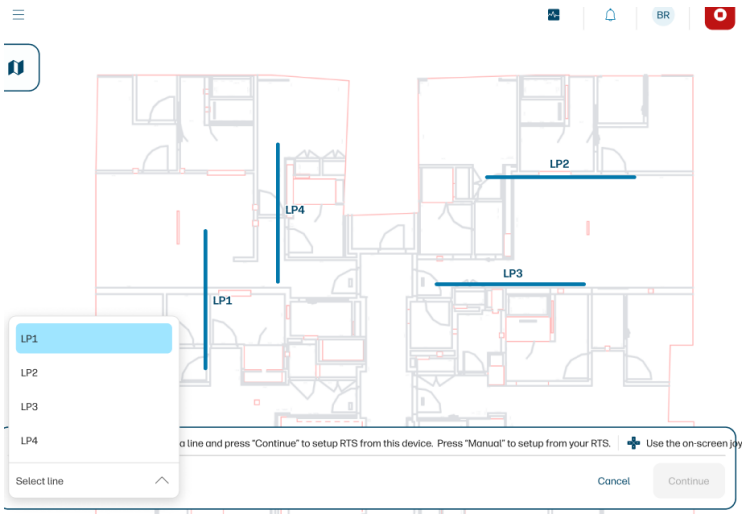
At the end of the process, you will see a list of the position and quality values.



Orientation to a line

If you selected orientation to a line, follow these steps.

1. Select the line you want to use as a reference and tap **Continue**.



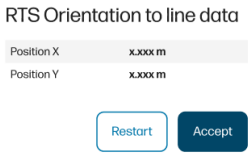
2. Select the right target type for point 1, and aim the RTS at the target.

3. Tap the search icon to ensure that the RTS has locked the prism, or ensure a good aim manually.

4. Repeat for point 2.
5. Tap **Finish**.

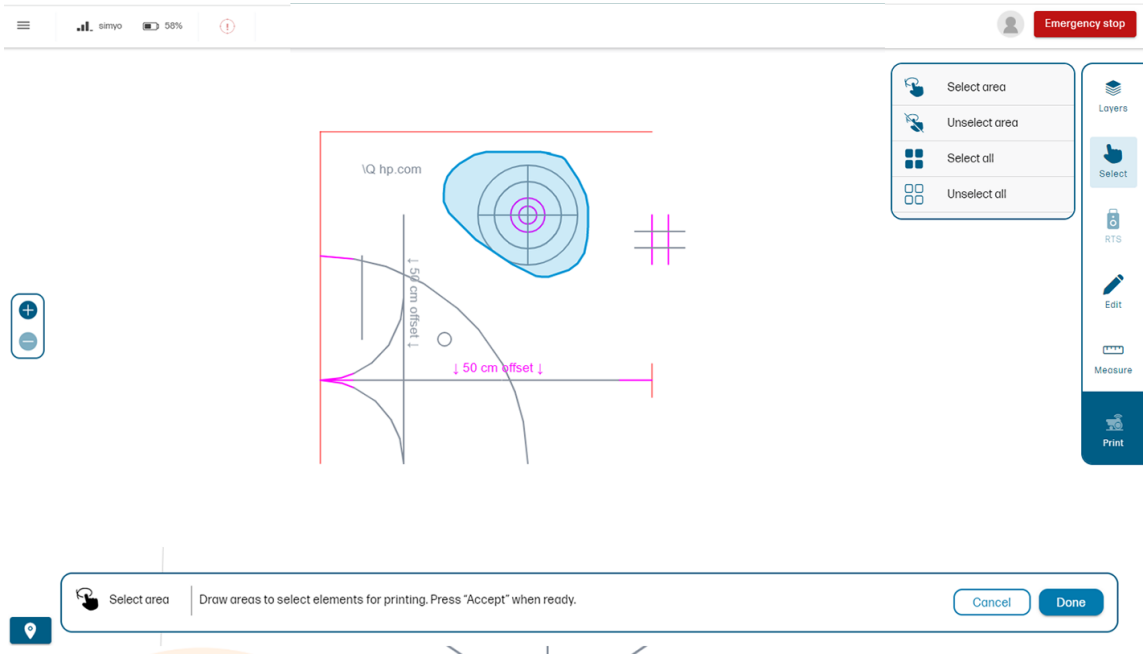
NOTE: The **Accept current setup** option can be used if you upload a new version of a DXF file. This option restores the setup coordinates of the RTS.

6. The RTS position after orienting to a line is displayed. Tap **Accept** to end the process.



Select elements to print

Before selecting elements to print, tap **Submit** to process the file. The button will turn into a **Print** button once the drawing is processed.



To select lines to be printed, tap **Select**, then choose from the options available:

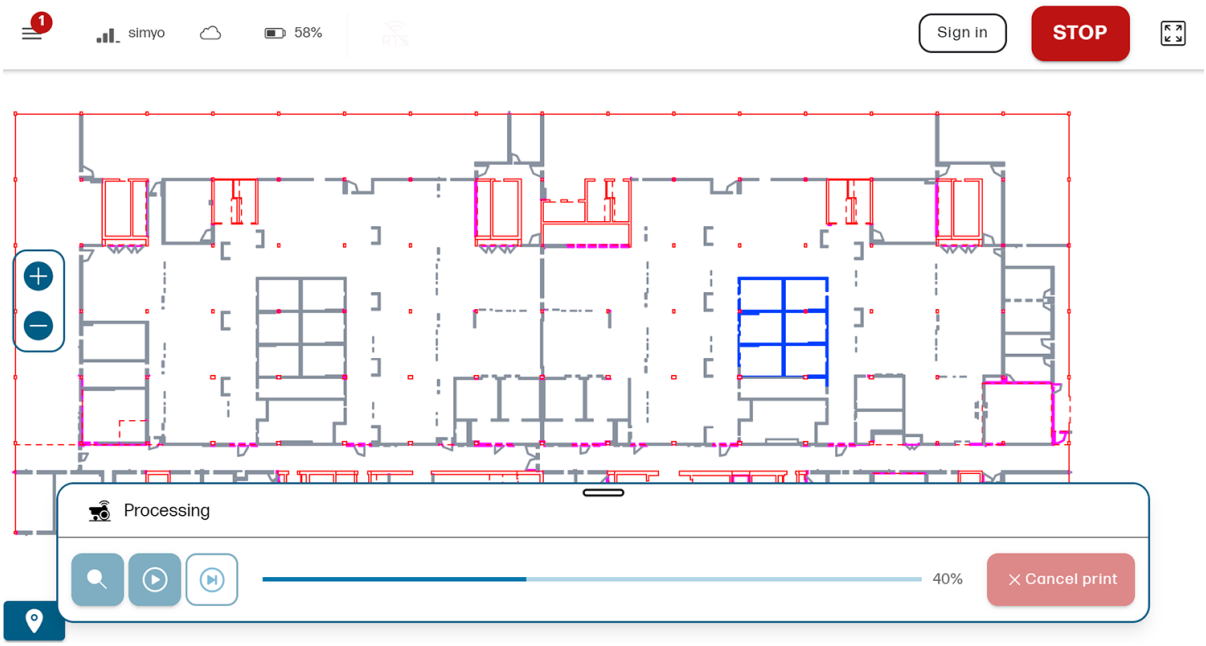
- Tap any individual line to select it.
- **Select area** by enclosing it with your finger.
- **Unselect area** by enclosing it with your finger.
- **Select all** to select all printable lines in the drawing.
- **Unselect all** to unselect everything.

The selected lines turn blue.

Tap **Done** to confirm the selection and send it to print.

Printing

While the robot is printing, you can monitor its status with the control panel.



- Green lines show what has been printed successfully.
- A flashing line shows what will be printed next.
- Orange lines show anything that has failed to print.
- Pink lines show anything that has failed to print because an obstacle is too close.

Rearm the robot after a safety stop

After an obstacle or safety stop, you need to rearm the robot to continue.

Enable manual control

1. Make sure the controller is on. Set the switch on the bottom of the controller to the right position (Bluetooth).
2. Connect the controller to the robot. Press the home button in the center of the controller. Lights in the controller will start blinking. They will stay on permanently once it is connected.
3. Press the A button to enable the manual control. Make sure a red pilot light appears at the front of the robot.
4. Hold down the L1 button to start moving the robot. Use the joystick to control its movement.

Recover control after safety sensor activation

1. Make sure the red pilot light is on (manual control is enabled). If not, press the A button.

2. Press the SELECT button to reset the sensors and rearm the robot.
3. Try to move the robot by holding the L1 button and steering with the joystick.

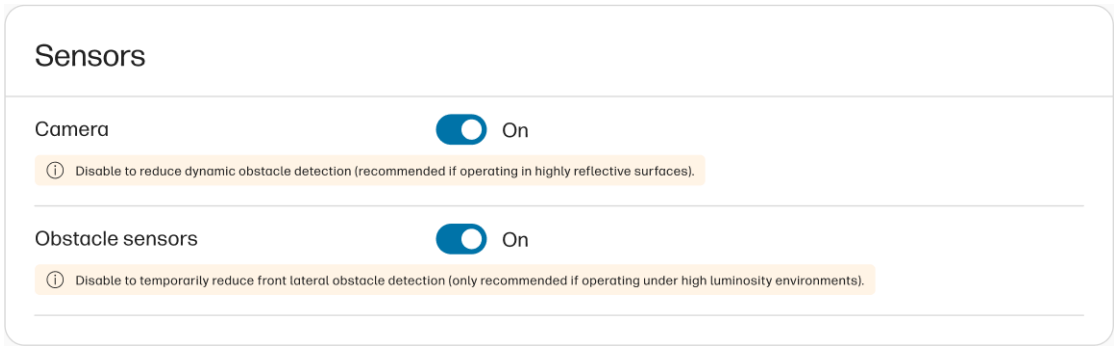
If the robot does not respond, make sure all four safety sensors are visible and pointing to an even, non-reflective ground surface. Shiny or very dark surfaces may activate the sensors.

If the robot still does not respond, press the RT button to reset the electronics, and try again.

Disable sensors (with Upgrade Kit 3.0 only)

When sunlight conditions create extreme shadows and bright areas, or if the printing surface is highly reflective, the camera sensors may not perform properly.

If the robot stops frequently, and you suspect that the sensors are malfunctioning, you can disable them by from the control panel by selecting **Settings** > **General**, and scrolling down to the Sensors section.



Emergency stop

The emergency stop button can be pressed manually from the robot itself or from the user interface. After pressing it, the robot will stop and its LEDs will flash red.

It is necessary to restart the robot to exit the emergency stop state.

IMPORTANT: If the emergency stop button is pressed while the inserted cartridge supply is pressurized, the following error will appear in the user interface: 0022-0334 (INK DELIVERY SYSTEM, IDS_RELIEF_VALVE, DEPRESSURIZATION_TIMEOUT).

You must wait 20 minutes for the cartridge supply to depressurize before you can remove it from the robot.

5 Robot maintenance

How to maintain your robot.

Clean the printhead

Clean the printhead at the end of each day in which the robot is used.

This maintenance process will remove dust, ink, or other substances that can block the nozzles and create print-quality issues. Printhead wiping should be done with a lint-free cloth.

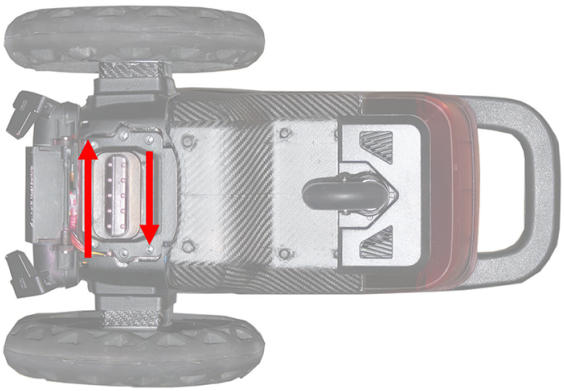
When applying the cleaning fluid, use a the lint-free cloth to absorb the excess of liquid to prevent the fluid from reaching the battery. Ethanol can damage the battery-cover sealing foam.

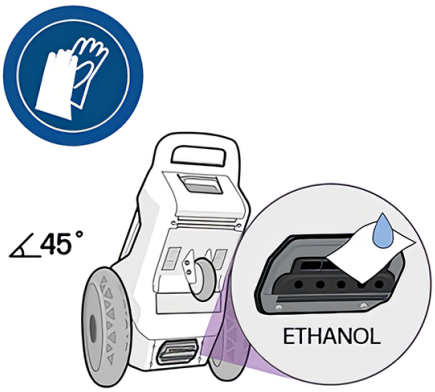
If you are going to store the robot, HP strongly suggests removing the battery before cleaning the printhead. If the robot will not be used for more than a week, purge the ink system: see Purge the ink system on page 62.

Clean the nozzles and the metallic plate in the direction of the arrows, and repeat four or five times until you are sure that they are clean.

NOTE: Preferably use the same cleaning fluid after using the water-based or solvent-based inks. Distilled water is also allowed, but only if you are sure to have used water-based inks. Do not use distilled water after using solvent-based inks, as it could damage the printhead nozzles.

TIP: HP strongly recommends wearing gloves throughout these cleaning operations.

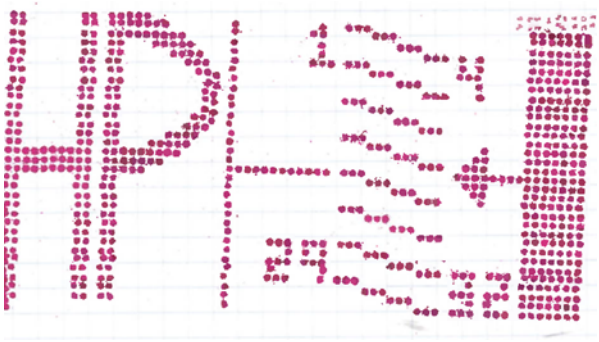




Check nozzle health

When you suspect that some nozzles are failing, HP strongly recommends printing a nozzle health plot.

1. The pattern shown below is printed twice (with more and less ink). Place an A4 or larger sheet of paper under the robot so that you can see the results and share them with your service representative if needed.



HP also recommends printing a nozzle health plot before every journey with the robot, especially if it has been stored for several days.

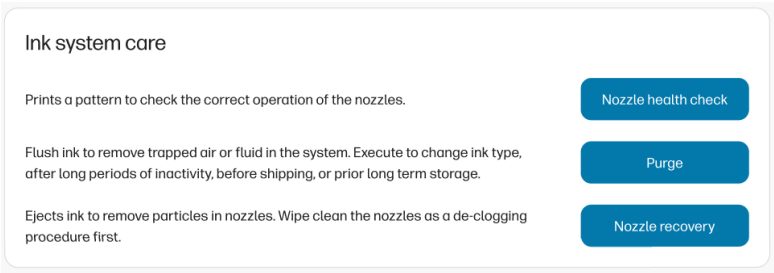
2. This plot helps to identify the blocked nozzles, so that you can clean them according to the instructions in this guide (see Clean the printhead on page 60).

Nozzle recovery

After cleaning, reprint the nozzle health plot.

If the issue persists, repeat the following procedure five times:

1. Apply cleaning fluid with a syringe (if available) or the spray tool over the nozzles; clean the nozzles with a wet wipe.
2. Put the robot over a waste kit to prevent spilling ink on the floor.
3. At the control panel, tap **Support** > **Ink system** > **Nozzle recovery**. All the nozzles will spit to remove excess cleaning fluid and ink.
4. Reprint the nozzle health plot.



5. If the issue persists, leave the wet wipe for at least 1 minute over the nozzles, allowing liquid to enter the nozzles.
6. Clean the nozzles with a wipe and cleaning fluid.
7. Reprint the nozzle health plot.

After recovering or before storing the robot, wipe once again to remove possible aerosol.

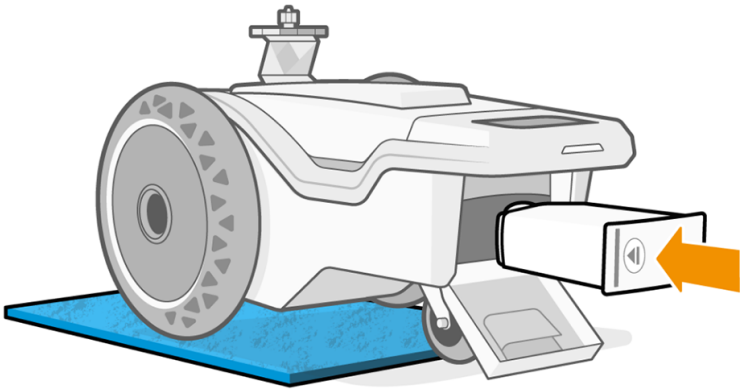
Purge the ink system

It is necessary to purge the ink system the first time that the robot is used, and every time you need to change the ink type.

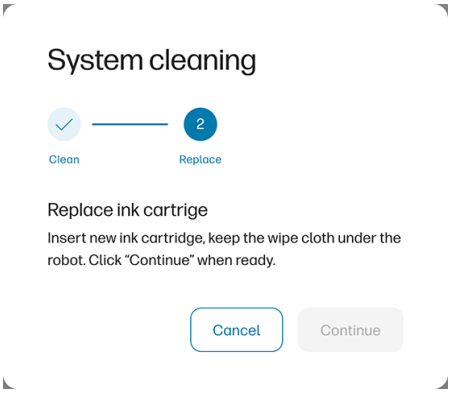
The control panel will remind you to purge the ink system when you open the ink-cartridge door.

You will need a waste kit to perform this operation.

1. Select the **Support** page in the control panel.
2. Scroll down to **Ink system care** and tap **Purge**.
3. Place a waste kit under the robot and tap **Continue**.



4. Insert the cleaning fluid.
5. When the printhead is clean, the control panel asks you to replace the ink cartridge. Tap **Cancel**.



6. The system cleaning will appear not to be completed. Tap **OK**. The process is done.

Check the safety sensors

NOTE: Before conducting this process, clean the sensors with a lint-free cloth, ideally dampened with distilled water.

The safety sensors are an important part of the robot because, in the event of a fall, they reduce risk by stopping the motors that turn the wheels.

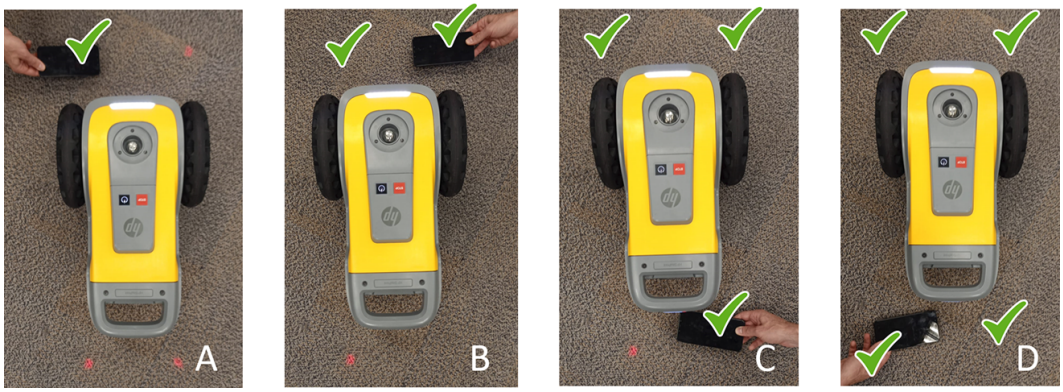
To ensure the correct operation of the safety sensors, it is mandatory to carry out a daily check in which you are asked to trigger the switch of each sensor.

This can be done by interrupting the safety sensor beam with a reflective black surface (such as a smartphone or tablet screen).

IMPORTANT: The sensors must be validated one after the other. If more than one are tested at the same time, you will not know the status of each sensor.

If any of the four sensors show persistent failure, stop using the robot and call your service representative. Operating the robot with a faulty sensor may result in a safety risk. HP will be exempt from any and all liability for the operation of the robot in this situation.

1. Turn the robot on. Check that it can be moved with the controller, and that the four red lights are on and pointing to the floor.
2. Place a reflective surface in front of the red light of one of the sensors (see image A).
3. Try to move the robot with the controller and check that it does not move (it should not).
4. Repeat with each of the other sensors.



NOTE: This robot is equipped with a safety function to avoid falling over. Disabling this function may result in a hazardous operation. It is important to clean and maintain the sensors regularly as described in the maintenance instructions.

Restarting the robot

Following an error or alert, you may be prompted to restart the robot. This action may resolve the issue in some but not all cases.

Do not restart the robot more than 10 times in a short period. For security reasons, the robot will block itself after more than 10-15 restarts in less than 30 minutes.

To recover from this block, simply turn the robot off, wait around 15-30 minutes, and turn it on again.

Software update

The robot's various functions are controlled by software that resides in the robot (also known as firmware).

One of the most important robot maintenance operations is to keep it up to date with the latest official software from HP.

In every release, a list of new features and enhancements is included.

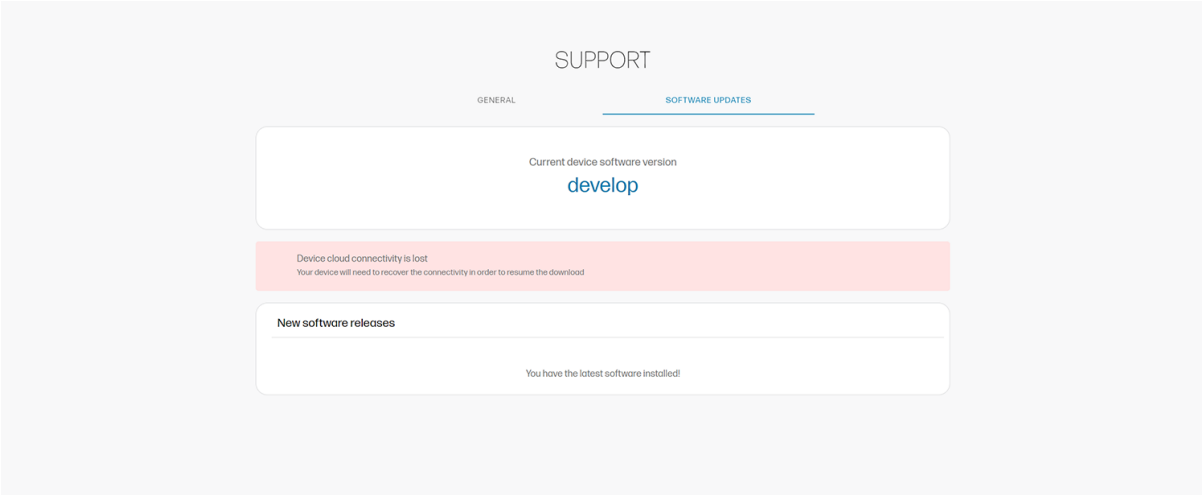
The process to update the robot is very simple. First, turn on the robot and connect it to the control panel by Wi-Fi using a supported device, such as a tablet computer.

NOTE: You must log in to HP SitePrint Cloud in order to receive software updates.

IMPORTANT: You must perform a software update before using the robot for the first time.

Tap **Support** > **Software updates**.

If a newer version is available, it will appear with the option to update.



6 Peripherals and accessories

Some items are provided by HP, and some must be provided by the customer.

Peripherals

Shipping handle

Turn the handle counterclockwise while pushing down.

IMPORTANT: To move the robot manually, always use the shipping handle and the rear handle.

Battery

Press and release the button to check battery status.

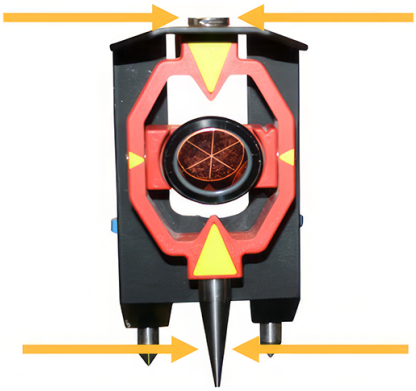
Battery-charging dock

Bipod

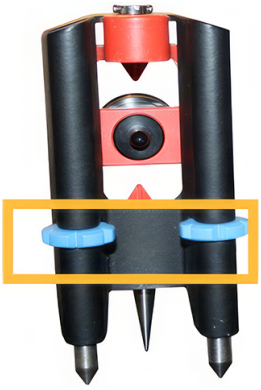
Use of the bipod

HP provides a bipod for the Leica mini-prism, to act as a leveling device.

1. Mount the mini-prism onto the bipod as shown below, and install the mini-prism pointers onto the mini-prism.



2. Set the bipod on the target points, and twist the blue leveling screws left or right to level it.



3. The leveling bubble and the mounting screw are on top.

Trimble radio module

How to set up this accessory.

Components

1. Trimble radio module
2. Locking system
3. Radio module holder

1. Insert the locking system, making sure that the pins match the screw hole on the top.



2. Attach the component underneath the handle with the two screws provided.

3. Insert the radio module into the holder and tighten the screw from below.

4. Slide the holder with the radio module into the rails of the locking system.

5. Press the button to allow it to slide fully in.

Ensure the antenna is facing down to avoid shadowing the prism.

6. Add space under the prism to prevent loss of line of sight.

Tablet compatibility

A tablet computer suitable for running the control-panel software should meet these specifications.

- Screen of up to 7 inches:
  - LCD IPS for better resolution and outdoor use
  - Around 500 nits
  - 1600 × 2560 pixels
  - 60 Hz
- Battery: 8000–10000 mAh (around 14 h duration)
- Connectivity:
  - Wi-Fi connection
  - USB-C
  - 4G LTE (optional)
- Processor: Qualcomm Snapdragon 860
- Basic storage capacity is sufficient
- Usable within a temperature range of –20°C to +60°C
- Any operating system that supports Google Chrome, the supported Web browser

7 Ink supplies

HP SitePrint provides a broad ink portfolio to execute construction building layouts over any material, with a choice of ink durability and a wide range of operating temperatures.

The ink portfolio consists of eight different ink SKUs with three different colors, and one cleaning cartridge. Each cartridge contains 400 ml of ink and can print for more than 4 km (2.485 miles).

You can easily swap ink cartridges for a multi-color layout, although you need to clean the ink delivery system when changing the ink type, to prevent ink mixing in the robot.

Based on ink composition and durability, we can distinguish four ink groups:

- **Water-based permanent:** Available in black, cyan, and magenta. Durability 2 weeks to 2 years, depending on environmental conditions.
- **Water-based semi-permanent:** Available in cyan and magenta. Durability 1 or 2 days to 1 year, depending on environmental conditions.
- **Solvent-based permanent:** Available in black. Durability 1 week to 2 years, depending on environmental conditions.
- **Solvent-based semi-permanent:** Available in blue and red. Durability a few days to 18 months, depending on environmental conditions.

Water-based inks are recommended for most uses; solvent-based inks are recommended for printing on waterproof materials or at temperatures below 0°C (32°F.)

Table 7-1 SitePrint inks

Ink type	Permanence	Part number	Name	Durability	Cleaning	Temperature	Dries over waterproof materials?
Water-based	Permanent	7J3R0A	HP SitePrint 103 - Black WB Permanent	High	Very slow	0 to 40°C (32 to 104°F)	No
		7J3R1A	HP SitePrint 104 - Cyan WB Permanent	High	Very slow		
		7J3R2A	HP SitePrint 105 - Magenta WB Permanent	High	Very slow		
	Semi-permanent	76Y80A	HP SitePrint 107 - Cyan WB Semi-Permanent	Low	Medium		
		76Y81A	HP SitePrint 108 - Magenta WB Semi-Permanent	Low	Medium		

Table 7-1 SitePrint inks (continued)

Ink type	Permanence	Part number	Name	Durability	Cleaning	Temperature	Dries over waterproof materials?
Solvent-based	Permanent	76Y82A	HP SitePrint 102 - Black SB Permanent	Medium	Slow	–10 to 40°C (14 to 104°F)	Yes
	Semi-permanent	76Y83A	HP SitePrint 101 - Red SB Semi-Permanent	Medium	Slow		
		7J3Q9A	HP SitePrint 100 - Blue SB Semi-Permanent	Low	Fast		
	Cleaning fluid	76Y84A	HP SitePrint 109 - Cleaning Fluid Cartridge	N/A			

Environmental conditions that may reduce ink durability

Before printing

- Dust on the surface: Small amounts of dust are not a problem, but try to remove a thick layer of dust.
- Low ink density
- Freshly poured concrete
- Friable surface: The surface tends to crumble or break into smaller pieces. Eco-concretes may have this problem.

After printing

- Exposure to water
- Exposure to sunlight
- Exposure to friction and traffic, especially soon after printing

How to increase ink durability

Wait until the ink is completely dry, then apply a clear coating on top of it.

Ink-cleaning procedure

In each case, HP recommends a cleaning test before printing the full layout.

Fast cleaning

1. Spray alkaline cleaner (bleach) on top of the layout.
2. Leave it for 15 minutes, then mop.

Medium cleaning

1. Clean with water and a brush broom. You will need to scrub.
2. Some alkaline cleaner (bleach) may accelerate the cleaning.

Slow cleaning

1. Spray alkaline cleaner (bleach) on top of the layout.
2. Leave it for at least 2 hours, then mop.

Very slow cleaning

1. Spray alkaline cleaner (bleach) on top of the layout.
2. Leave it for at least 6 hours, then mop.

8 Robot specifications

Here you can find the various specifications of your robot.

Battery-charger, battery, and robot power specifications

Power specifications of the robot, its battery, and its battery charger.

Table 8-1 Battery-charger, battery, and robot power specifications

Characteristic	BCLAA-2213	BCLAA-2213-T / A2PT0A
Charger: Number of power cords	1	1
Charger: Input voltage	100–240 V (two wires and protective earth)	100–240 V (two wires and protective earth)
Charger: Input frequency	50–60 Hz	50–60 Hz
Charger: Maximum output voltage	17.4 Vdc	17.4 Vdc
Battery: Nominal output voltage	14.4 Vdc	14.4 Vdc
Battery: Nominal capacity	6.9 Ah, 99 Wh	6.9 Ah, 99 Wh
Robot: Typical power consumption in operating mode	23 W	33 W
Robot: Power consumption in navigation mode	22 W	32 W
Robot: Power consumption in ready mode	17 W	17 W

Site voltage must be within the “Input voltage” range.

Sustainability specifications

You can find the up-to-date sustainability specifications of your robot at the HP website.

See http://www.hp.com/sustainability.

Environmental specifications

For successful operation, the robot should be kept within the specified range of environmental conditions.

Using the robot outside the specified range may cause print-quality problems or damage electronic components.

Table 8-2 Robot environmental specifications

Characteristic	Model 1: BCLAA-2213	Model 2: BCLAA-2213-T / A2PT0A
Relative humidity range when operating	20–80%	20–80%
Temperature range when operating	Solvent-based inks: –10 to +40°C (14 to 104°F) Water-based inks: 0 to +40°C (32 to 104°F)	Solvent-based inks: –10 to +50°C (14 to 122°F) Water-based inks: 0 to +50°C (32 to 122°F)
Temperature range when in storage	–20 to +55°C (–4 to +131°F)	–20 to +55°C (–4 to +131°F)
Temperature gradient	no more than 10°C/h (18°F/h)	no more than 10°C/h (18°F/h)
Maximum altitude when operating	2000 m (6600 ft)	2000 m (6600 ft)
Surface condition when operating	Dry	Dry
Storage conditions	Indoor	Indoor
Battery charging	Indoor	Indoor
Temperature range when charging battery	0 to 40°C (32 to 104°F)	0 to 40°C (32 to 104°F)

NOTE: If the robot or ink cartridges are moved from a cold location to a warm and humid location, water from the atmosphere can condense on the robot parts and cartridges and can result in ink leaks and robot errors. In this case, HP recommends that you wait at least 3 hours before turning on the robot or installing the ink cartridges, to allow the condensation to evaporate.

Acoustic specifications

Declared noise emission levels for the HP SitePrint Robot .

Sound pressure levels measured according to ISO 11201 and sound power levels measured according to ISO 3744.

Table 8-3 Acoustic specifications

Characteristic	Status	Specifications
Sound pressure	Printing (lines)	55 dB(A)
	Standby	40 dB(A)
Sound power	Printing (lines)	≤ 7.0 B(A)
	Standby	≤ 5.5 B(A)

Radio specifications

Characteristics of the robot's radio communications.

Table 8-4 **Radio specifications**

Characteristic	Specifications
WiFi	Wi-Fi 6 (802.11ax)
Bluetooth	Bluetooth 5.2
LTE FDD	B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28
LTE TDD	B38/B39/B40/B41
UMTS	B1/B2/B4/B5/B6/B8/B19
GSM	B2/B3/B5/B8

Current limitations

These limitations may be removed in future.

- Radio communications interference may occur while the robot is printing, causing some lines not to be printed.
- Characters and graphics have a minimum size, which is 12 mm (0.5 in) for characters. They cannot be printed successfully if smaller.
- Elements cannot be printed within 20 cm (7.9 in) of an obstacle.

Currently, there are certain surfaces that can mistakenly trigger the detection of a cliff and cause a safety stop. These known surfaces are the following:

- **Reflective surfaces**: Extremely reflective surfaces such as mirrors, polished metal or any other highly reflective surfaces.
- **Dark surfaces**: Dark spots, obscure surfaces, and dark colors can accidentally activate the safety stop. Screens from mobile devices can also trigger this safety detection.
- **Water puddles**: In certain weather conditions, puddles can act as a mirror and activate the safety detection.

There are several possible workarounds if a false-positive safety stop is triggered.

If SitePrint stops during a job and the four sensors are not emitting light, perform the following checks:

1. Check if any area around the robot has a dark/reflective spot.
2. Pick up the robot with the handle and move it away from the specific area. The drive wheels are disabled, so manual control is not available.
3. If you need to control the robot manually after relocating, press the SELECT button on the remote control.
4. Drive the robot away with the joystick and resume printing.

NOTE: It is not necessary to restart the robot if it stops. Relocating it from the spot will restore its functionality.

To mitigate behavior in conflictive areas, the following actions can be taken:

- Cover potentially conflictive spots and dark surfaces.

- Define potentially conflictive areas in the job site as obstacles in the HP SitePrint user interface.

Index

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