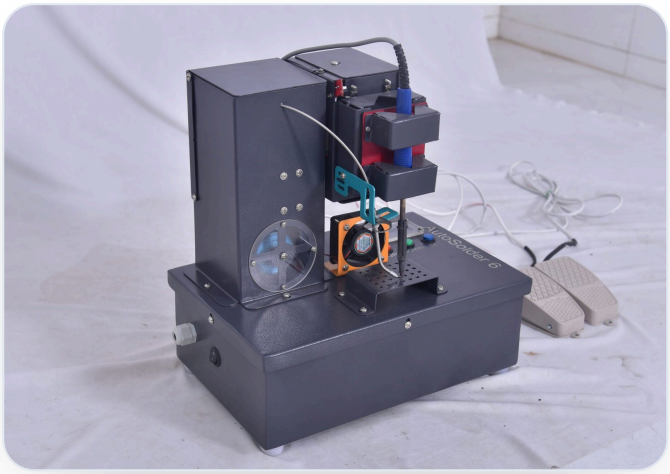
hjLabs.in
INDUSTRIAL AUTOMATION

OFFICIAL USER GUIDE · V6.0

OPERATOR'S MANUAL

AutoSolder 6

The bench-top automatic soldering robot — one foot pedal, one perfect joint, every time.



> Every button, every screen, every setting and every web page — explained for the operator. Read it once; then keep it by the machine.

Pedal-driven
Both hands stay on the board. One press = one finished joint.

Three modes
Pre-feed, post-feed or fully manual wire control.

Wi-Fi dashboard
Tune every parameter from a phone or PC — no app to install.

Counts your work
A built-in solder-point counter that survives power-off.

17	30+	16×2	A4
sections — every control	annotated diagrams	display + 3 buttons	print-ready PDF

WHAT'S INSIDE · IN THE ORDER YOU MEET IT

PRODUCT
hjLabs.in AutoSolder 6 — Automatic Soldering Machine
firmware v6.0 · Wi-Fi dashboard + HTTP API

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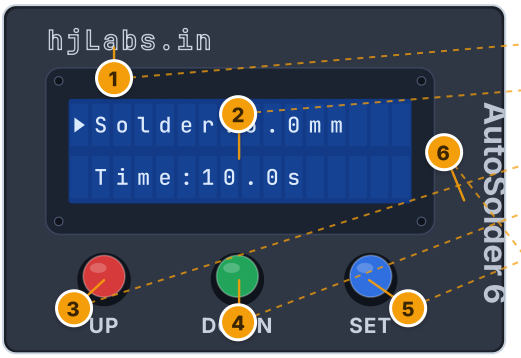
Contents & how to read this guide

AutoSolder 6 makes one solder joint per press of a foot pedal. This guide walks every control in the order you meet it.

The anatomy of the control panel



1. **Brand silk** — the panel is the machine's whole local interface — display plus three buttons
2. **16×2 display** — two lines of sixteen characters; line 1 is the item you are editing, line 2 previews the next (see §02)
3. **UP (red)** — raise the value of the shown setting by 0.25; hold it to run up quickly
4. **DOWN (green)** — lower it by 0.25; hold to run down
5. **SET (blue)** — step to the next menu page — it never changes a value
6. **Model plate** — AutoSolder 6 — quote this and your firmware version when you contact support (§17) ↗

Figure 00.1 — The front panel. Every number on a diagram is tethered by a yellow line to the key beside it; click any figure to zoom it, and hover a number to read what it does.

How this guide works

Each section covers one part of the machine as a figure whose **numbered call-outs** are tethered to a key naming every button, field and icon. Photographs are the real AutoSolder 6; the display and dashboard drawings are faithful to the shipped firmware.

The three ways you drive it

CONTROL	WHAT IT IS	USE IT TO
Foot pedals	Two pedals on the floor	Run a solder cycle · feed extra wire — hands stay free (§06)
Panel buttons	UP · DOWN · SET	Read and change the five settings on the display (§02)
Web dashboard	Any phone or PC on the same Wi-Fi	Everything above, plus every machine parameter, tests and updates (§08–§14)

The machine ships locked. On first power-on it shows **DEVICE LOCKED**. Unlock it once — on the panel or in the browser — and it stays unlocked for good (§03).

Contents

Safety & warranty. This machine moves a motor-driven arm carrying a soldering iron at roughly 350 °C. Never put fingers under the iron while a pedal is connected; keep the area ventilated; switch off at the mains before opening the base; wash your hands after handling lead-bearing solder. Supplied **as-is, without warranty of any kind**; hjLabs.in is not liable for any loss, injury or damage arising from use.

QUICK REFERENCE

Quick reference — at a glance

Keep this page open while you learn the machine. Everything on it is explained in full later in the guide.

The panel buttons

BUTTON	WHAT IT DOES
UP (red)	+0.25 on the shown setting · **hold** to run up fast
DOWN (green)	−0.25 · **hold** to run down fast
SET (blue)	Next menu page. Six pages, then back to the first

The foot pedals

PEDAL	WHAT IT DOES
Pedal 1 — Cycle	Runs one complete solder cycle (§05). One press = one joint
Pedal 2 — Dispense	Feeds solder wire by hand — a chunk per tap, or continuously while held

Everything saves itself. Values you set on the panel or the web page are written to the machine's memory immediately and survive power-off.

The six display pages

#	PAGE	RANGE
1	**Solder** — wire fed per joint	0.25 – 100 mm
2	**Time** — iron dwell on the joint	0.25 – 10 s
3	**Fan** — cool-down after the joint	0 – 20 s
4	**Type** — Pre / Post / Manual	3 modes
5	**Z-Hgt** — how far the iron drops	0 – 50 mm
6	**Network** — address & Wi-Fi state	read-only

The three modes — at a glance

MODE	ORDER OF EVENTS	USE IT FOR
Pre	wire → down → dwell → up	Most through-hole work; the default
Post	down → wire → dwell → up	Pre-tinned pads, wire that must melt on a hot joint
Manual	down → you feed → up	Odd joints, learning a new board, rework

Common tasks

TO...	DO THIS
Change how much solder	SET to **Solder** → UP / DOWN (§04)
Change the dwell	SET to **Time** → UP / DOWN (§04)
Set the drop depth	SET to **Z-Hgt**. **0** = drop until the limit switch (§04)
Switch mode	SET to **Type** → UP / DOWN (§05)
Find the web page	SET to **Network** → read the address (§07)
Feed wire by hand	Tap **pedal 2** (§06)
Reset the counter	Dashboard → ↺ beside the number (§08)
Move it to new Wi-Fi	Dashboard ≋, or power-cycle 5× quickly (§07)

Before every session: check the iron tip is clean and tinned → check the wire runs freely off the spool → switch on and let the iron reach temperature → test one joint on a scrap board before you touch the real one.

If something looks wrong

YOU SEE...	LIKELY CAUSE	WHAT TO DO
Display reads **DEVICE LOCKED**	Machine not yet activated	Unlock it — panel code or web password (§03)
Pedal does nothing	Machine is locked, or pedal unplugged	Unlock (§03); check the pedal plug and the state pills (§08)
Display blank, machine still works	The display cable has come loose	It runs headless by design — reseat the display cable; it recovers on its own (§17)
Iron drops but never stops	Limit switch not tripping	The descent aborts itself after 20 s. Check both limit switches (§14)
Too much / too little solder	**Solder Size** wrong, or wire feed uncalibrated	Adjust Solder Size (§04); then calibrate pulses/mm (§13)
Feeder slips, wire does not move	Feed pressure or a jam in the guide tube	Clear the tube, check the drive pressure (§17)
Web page will not load	Machine not on your Wi-Fi	Read the **Network** page on the display (§07)
The wrong motor moves	Pin map does not match your wiring	Swap the Z / Dispense pins in GPIO mapping (§14)

Need a hand?
hjLabs.in support · **+91 70165 25813** · hemangjoshi37a@gmail.com — quote your firmware version and what the display shows.

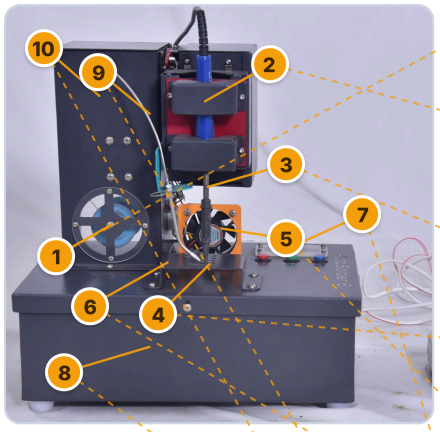
Keep it updated
New firmware installs over Wi-Fi from the dashboard — no cable, no programmer (§15).

Handle with care
The iron is hot long after power-off. Let it cool before moving or covering the machine.

01 · THE MACHINE

The machine, its parts & first power-on

AutoSolder 6 is a column, a wire feeder, a motorised soldering iron and a fan, all driven by the controller in the base.



1. **Solder-wire spool** — 0.8 mm rosin-core wire on a free-running reel; keep it turning freely
2. **Wire-feed drive** — a stepper and a knurled pulley push the wire — its speed and mm-per-turn are set in §11 ↗
3. **Z carriage** — the stepper and lead-screw that lower and raise the iron; how far it drops is **Z-Hgt** (§04) ↗
4. **Soldering iron** — a standard replaceable-tip iron; heat is set on its own supply, not by this machine
5. **Cooling fan** — blows across the joint after each cycle for **Fan Time** seconds (§04) ↗
6. **Work plate** — the perforated bed your jig or board sits on
7. **Front panel** — display and the three buttons — see §02
8. **Base enclosure** — the controller, the motor drivers and the power supply live in here
9. **Wire guide tube** — the spiral steel tube that carries the wire from the drive to the tip
10. **Column** — the rigid backbone everything hangs from — never lean on it

Figure 01.1 — AutoSolder 6, front view. The machine is a single rigid column: wire goes in at the top, the iron comes down at the bottom.

What is in the box

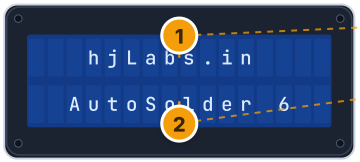
ITEM	NOTES
AutoSolder 6	Assembled — column, feeder, Z axis, iron and fan on one base
Two foot pedals	Pedal 1 runs the cycle · pedal 2 feeds wire (§06)
Mains lead	Into the inlet on the side of the base
Soldering iron	Fitted, with a conical tip
This guide	Keep it with the machine

Figure 01.2 — The two pedals. Mark them; they are identical outside and do very different things (§06).

Setting it up — first power-on

1. Stand the machine on a **flat, solid bench**. It is heavy at the base by design — do not shim it.
2. Plug **pedal 1** (cycle) and **pedal 2** (dispense) into their sockets and lay the leads where nobody will trip.
3. Load the spool: feed the wire into the guide tube, through the drive, until about 5 mm sticks out past the tip.
4. Connect the mains lead and switch on at the rocker on the side of the base.
5. The display plays the **hjLabs.in → AutoSolder 6** start-up animation, then shows either the settings menu (§02) or **DEVICE LOCKED** (§03).
6. Let the iron come up to temperature, wipe the tip on a damp sponge and re-tin it.
7. Put a **scrap board** under the tip and press pedal 1 once. Adjust Solder Size and Time (§04) until the joint looks right — then start work.

Never run a cycle with nothing under the tip. The iron will drive down to the limit switch and press hot metal against the work plate.



1. **Line 1** — the maker — hjLabs.in
2. **Line 2** — the product. Seeing both means the controller booted and the display is healthy

Figure 01.3 — The start-up screen, about three seconds after switch-on.

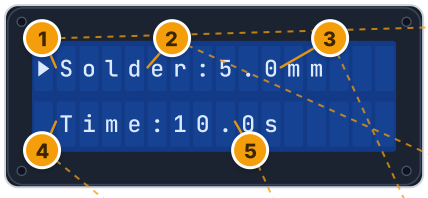
No start-up screen but the pedal still works? The display has come loose on its cable. The machine deliberately keeps running without it and re-connects the display by itself once the cable is reseated (§17).

02 · PANEL & DISPLAY

The panel, the display & the six pages

Three buttons and sixteen characters by two lines are all you need for day-to-day work. This is how to read them.

Reading the display



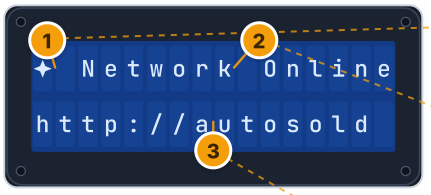
1. **Selector** — the solid arrow marks the line you are editing — UP / DOWN act on **this** line only
2. **Setting name** — shortened to fit sixteen characters: `Solder` · `Time` · `Fan` · `Type` · `Z-Hgt`
3. **Value & unit** — the live value; changes the instant you press a button and is saved straight away
4. **No arrow** — line 2 is only a preview of the next page — it cannot be edited from here
5. **Next page** — press **SET** and this line moves up to become the editable one

Figure 02.1 — The settings display. Sixteen characters by two lines, exactly as the machine draws it.

The six pages, in SET order

#	SHOWS	MEANING	LIMITS
1	`Solder:5.0mm`	Wire fed per joint	0.25 – 100
2	`Time:10.0s`	Iron dwell on the joint	0.25 – 10
3	`Fan:15.0s`	Cool-down after the joint	0 – 20
4	`Type:Pre`	Pre · Post · Manual	3 modes
5	`Z-Hgt:0.0mm`	Iron drop depth · 0 = auto	0 – 50
6	`Network`	Address & Wi-Fi state	read-only

Press **SET** six times and you are back where you started. The machine always powers up on page 1 showing the values you last used.



1. **Spark icon** — marks a status page rather than a setting
2. **Wi-Fi state** — **Network Online** = joined and reachable · **Network Setup** = not joined yet (§07) ↗
3. **Address** — too long for sixteen characters, so it scrolls: the `.local` name, then the IP address

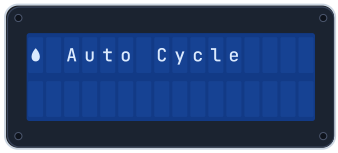
Figure 02.2 — Page 6, **Network**. Read-only: UP and DOWN do nothing here.

The three buttons

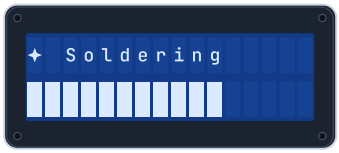
BUTTON	TAP	HOLD
UP	+0.25 (or next mode)	Runs up continuously after 1 s
DOWN	−0.25 (or previous mode)	Runs down continuously after 1 s
SET	Next page	— nothing extra

SET never changes a value and there is no “save” button. Whatever the display shows is what the machine will do on the next pedal press.

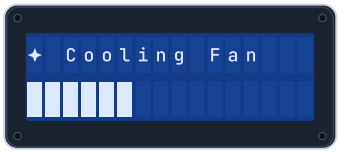
Screens you will meet while the machine is working



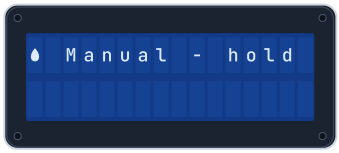
Auto Cycle — pedal 1 pressed; the cycle has begun.



Soldering — the bar fills over the **Time** you set.



Cooling Fan — the bar fills over **Fan Time**.



Manual - hold — Manual mode: keep pedal 1 down (§05).

The machine returns to the settings menu by itself as soon as a cycle finishes — you never have to dismiss these screens.

The buttons are ignored while a cycle is running. The controller is busy driving the motors, so change settings between joints, not during one.

03 · UNLOCKING

Unlocking the machine — once, then never again

A new AutoSolder 6 arrives locked. Two minutes of one-time setup and it is yours for good.

Why it is locked

Every AutoSolder 6 leaves hjLabs.in locked to the controller inside it. Unlocking is a **one-time** step that ties the machine to its own hardware; after it, the machine powers up straight into the settings menu forever. Nothing you do later — factory reset, firmware update, new Wi-Fi — will lock it again.

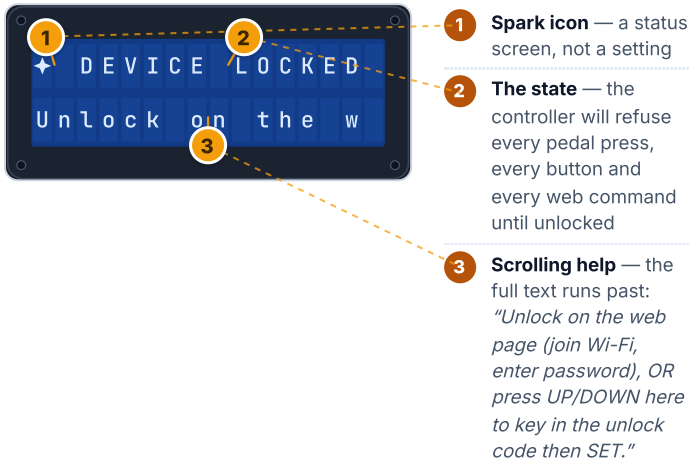


Figure 03.1 — The locked screen, shown from the moment the start-up animation ends.

> **While locked, the machine is inert.** Pedals do nothing, the settings cannot be changed, and every web command that would move a motor answers `403 Device locked`. This is deliberate.

Way 1 — unlock on the machine

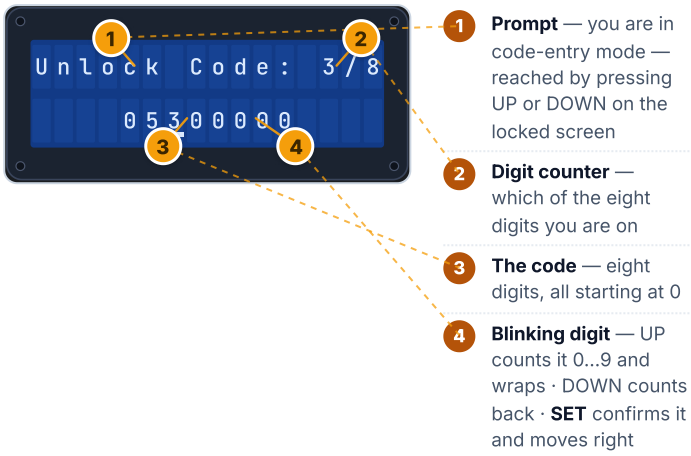


Figure 03.2 — Keying the unlock code in on the machine itself. No network needed.

1. On the locked screen, press **UP** or **DOWN** once. The code-entry screen appears.
2. Set the first digit with **UP** / **DOWN**, then press **SET** to move to the next.
3. After the eighth digit, **SET** checks the code.
4. Right code → `✦ Unlocked! / Welcome - AutoSolder 6`, then the menu. Wrong code → `Wrong code` and it clears back to eight zeros — try again, there is no lock-out.

> Your **eight-digit unlock code** is supplied with the machine, on the delivery note. It is not printed in this guide and never shown on the display.

Way 2 — unlock in the browser

1. Get the machine onto your Wi-Fi and open its page — see §07. This works even while it is locked; the dashboard is readable, just not usable.
2. A full-screen **Device Locked** panel covers the page with one password box.
3. Type the **activation password** supplied with the machine and press **Activate**.
4. The page reloads unlocked, and the display drops straight into the settings menu.

> The activation **password** (web) and the eight-digit **code** (panel) are two different secrets for the same lock. Either one unlocks the machine permanently; you never need both.

SYMPTOM	WHAT IT MEANS	DO THIS
Display shows **DEVICE LOCKED**	Never activated, or a replacement controller was fitted	Unlock by either route above
Web page greys out behind a lock panel	Same — the machine is locked	Enter the activation password
`403 Device locked` from a script	An API call was made while locked	Unlock first, then retry (§16)
Code refused every time	Wrong code, or digits confirmed out of order	Start again; the counter shows which digit you are on
Locked again after an update	Should not happen	Contact hjLabs.in with your machine's MAC address (§17)

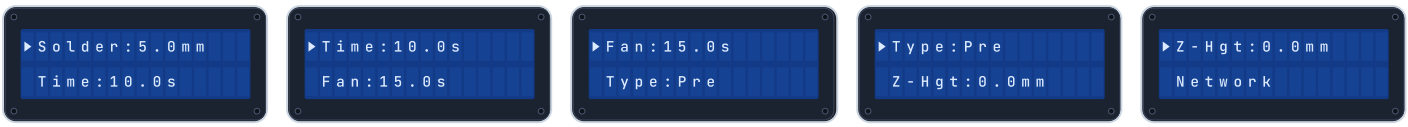
Keep it safe

Write the unlock code and activation password somewhere your workshop can find them — a replacement controller needs them again.

04 · THE FIVE SETTINGS

The five settings — what each one really does

Solder, Time, Fan, Type and Z-Hgt are the whole language of the machine. Learn these five and you can solder anything it can reach.



1 · Solder Size | 2 · Solder Time | 3 · Fan Time | 4 · Type / Mode | 5 · Z Height

Figure 04.1 — The five editable pages, in the order **SET** visits them. Line 2 always previews what comes next.

What each one actually does

SETTING	PHYSICALLY	RANGE · STEP	TURN IT **UP** WHEN…	TURN IT **DOWN** WHEN…
Solder Solder Size	Millimetres of wire the feeder pushes out for this joint. This is **length of wire**, not a volume — a thicker wire at the same setting puts far more metal on the pad.	0.25 – 100 mm 0.25 mm	The joint is starved — a dull, concave fillet that does not wet the pad	You get a blob, a bridge to the next pad, or a spike
Time Solder Time	Seconds the iron stays pressed on the joint after it arrives. The display draws a progress bar for exactly this long.	0.25 – 10 s 0.25 s	The solder does not flow and stays grainy — heavy copper or a ground plane needs longer	Pads lift, plastic parts soften, or the tip burns the board
Fan Fan Time	Seconds the cooling fan runs after the iron lifts. **0** switches the fan off entirely.	0 – 20 s 0.25 s	You want the joint solid before the board moves, or you are clearing fume faster	You are chasing cycle time and the joint is small
Type Mode	Which of the three cycles runs on a pedal press — **Pre**, **Post** or **Manual**. Explained in full in §05.	3 modes	—	—
Z-Hgt Z Height	How far the iron travels down. **0 = automatic**: it descends until a limit switch trips, which is right for almost every job. Any other value is a fixed depth in millimetres.	0 – 50 mm 0.25 mm	The tip is stopping short of a recessed joint (fixed-depth mode)	The tip is pressing too hard — or set it back to **0** and let the switch decide

Z Height — the one to understand

Leave it at **0** unless you have a reason not to. At 0 the iron simply drives down until the spring-loaded head or the lead-screw switch says "I have touched something", so every board thickness and every jig height is handled automatically, and the tip lands with the same gentle pressure each time.

Give it a number and the machine counts millimetres instead. That is useful when the joint sits down inside a recess the head cannot reach, or when you deliberately want the tip to stop just above the work. It is also the setting that can drive the tip **into** the board if you get it wrong, so test it on scrap.

> **The 20-second rule.** In automatic mode, if no limit switch trips within twenty seconds the machine stops the descent by itself and prints a warning. If you see the iron creep all the way down and then stop, a limit switch is not being reached — see §14.

A worked starting point

JOB	SOLDER	TIME	FAN	MODE	Z-HGT
Ordinary through-hole pin, 1.6 mm FR4	5.0 mm	1.5 s	2 s	Pre	0
Heavy pad on a ground plane	7.5 mm	3.0 s	3 s	Pre	0
Pre-tinned pad / wire to terminal	3.0 mm	2.0 s	2 s	Post	0
Unfamiliar board, first article	—	2.0 s	2 s	Manual	0

These are starting points, not specifications — wire diameter, alloy, tip shape and iron temperature all move them. Change **one** setting at a time and run a test joint after each.

> **Every change takes effect on the very next pedal press.** There is no confirm step and no undo. If you are unsure what you just changed, press SET around to the page and read the value back.

Reading the joint — what it is telling you to change

THE JOINT LOOKS LIKE	IT MEANS	CHANGE THIS	WHICH WAY
A smooth, shiny cone that wets the pad and climbs the lead	**Correct.** Leave it alone	—	—
Dull, grainy, sitting *on* the pad rather than wetting it	Not enough heat, or a dirty tip	**Time** — after wiping and re-tinning	Up, 0.25 s at a time
Thin and concave, the lead visible through it	Not enough solder	**Solder**	Up, 0.5 mm at a time
A ball that hides the lead, or a bridge to the next pad	Too much solder	**Solder**	Down
A spike or tail as the tip lifts	Still molten when the iron left	**Time**, then **Solder**	Time up, Solder down
The pad lifted, or the board is scorched	Far too much heat	**Time**	Down; check the iron's own temperature

Change **one** setting, make one joint, look at it. When several in a row are right, note the numbers on the machine record at the end of §17 — that is your recipe for that board.

05 · PRE · POST · MANUAL

The three solder cycles

Pre, Post and Manual differ in one thing only — when the wire is fed. Pick the one that suits the joint.

Every cycle, in one picture

One press of **pedal 1** runs one complete cycle. What changes between the modes is **when the wire is fed** — everything else is the same.

PRE — Type:Pre — the default

POST — Type:Post

MANUAL — Type:Manual

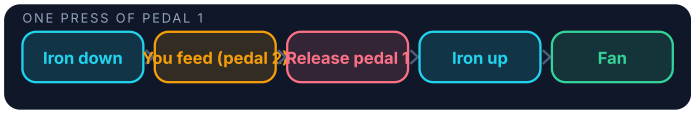


Figure 05.1 — The three cycles. The fan step is skipped entirely when **Fan Time** is 0.

Which mode, and why

MODE	WHAT HAPPENS	CHOOSE IT WHEN
Pre	The feeder pushes **Solder Size** millimetres of wire out **before** the iron comes down. The tip arrives onto wire that is already sitting on the pad, melts it, holds for **Time**, then lifts.	This is the normal mode. Wire and heat arrive together, so the flux is fresh and the joint wets fast. Use it for ordinary through-hole work.
Post	The iron comes down **first** and heats the joint, then the feeder pushes the wire into the already-hot pad, then it holds for **Time** and lifts.	The pad is pre-tinned, or heavy enough that cold wire would just sit there. Also better when the wire would roll off a curved surface.
Manual	The iron comes down and **stays down while you keep pedal 1 pressed**. Every tap of **pedal 2** feeds one **Solder Size** of wire. Release pedal 1 and the iron lifts.	Rework, odd geometry, an unfamiliar board, or when you are dialling a job in and want to watch the joint form.

Solder Size means the same thing in all three modes — the length of wire fed in one shot. In Manual mode it is fed per tap of pedal 2, so three taps deposit three times as much.

What the machine does, step by step

#	STEP	GOVERNED BY
1	Display switches to ◆ `Auto Cycle`	—
2	*Pre only:* the feeder pushes wire	**Solder Size** · feed speed (§11)
3	The Z axis drives down	**Z-Hgt**, or the limit switches at 0 · travel speed (§12)
4	*Post only:* the feeder pushes wire now	**Solder Size**
5	*Manual only:* holds down while pedal 1 is pressed; pedal 2 feeds	you
6	Dwell — progress bar on the display	**Solder Time**
7	The Z axis returns up **exactly the distance it came down**	measured, not guessed
8	The fan runs, with its own progress bar	**Fan Time** · skipped if 0
9	The solder-point counter increments by one	§08
10	The settings menu comes back	—

Step 7 is worth knowing about: the controller **counts the steps it took on the way down** and returns exactly that many. It never assumes a height. That is why the machine handles a stack of boards of different thicknesses without being told, and why you should not push on the head while it is moving.

Manual mode holds the iron on the joint for as long as you hold the pedal. There is no dwell timer protecting the board — it is entirely on you. Lift your foot the moment the joint flows.

Trying a mode out

Change **Type** on the display (§04) and press pedal 1 on a scrap board. There is nothing else to configure.

Testing without the pedal

The dashboard's **Move Iron** button runs the same cycle from the browser (§08).

Feeding without a cycle

Dispense Solder, or a tap of pedal 2, feeds wire with no motion at all (§06).

Pre or Post? — the deciding question

Ask: **would the wire stay where I put it, on a cold pad?**

- **Yes** — a flat pad, a hole with a lead in it, anything that traps the wire. Use **Pre**: the wire is already in place when the heat arrives, so the flux is fresh at the moment it is needed.
- **No** — a curved terminal, a vertical face, a pad the wire would roll off. Use **Post**. The tip goes down first and holds the joint; the wire is then fed into a surface that is already hot and already tinned.
- **Not sure** — use **Manual** for the first few, watch where the solder wants to go, then commit.

Post costs a little time. The pad has to come up to temperature before the wire arrives, so a Post joint usually needs a slightly longer **Time** than the same joint in Pre.

What the display shows, moment by moment

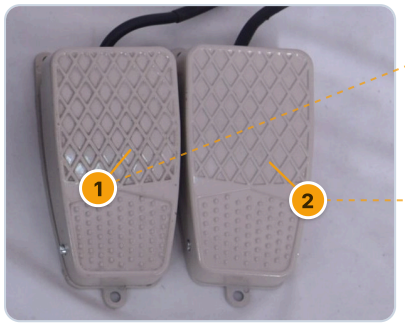
YOU SEE	THE MACHINE IS	ROUGHLY
◆ `Auto Cycle`	Starting — feeding wire (Pre) or about to descend	< 1 s
✦ `Soldering` + bar	Holding the tip on the joint	exactly **Solder Time**
◆ `Manual - hold`	Waiting for you — Manual mode only	while you hold pedal 1
✦ `Cooling Fan` + bar	Back up, and running the fan	exactly **Fan Time**
The settings menu	Finished — the counter has gone up by one	—

If the display sticks on ◆ `Auto Cycle` and the head keeps creeping down, no limit switch is being reached. The machine will stop itself after twenty seconds — then go and test the switches (§14).

06 · THE FOOT PEDALS

The foot pedals & running real work

Both hands stay on the board. Pedal 1 makes a joint; pedal 2 gives you wire. That is the whole workflow.



1. **Pedal 1 — Cycle** — one press runs one complete solder cycle in whatever mode is selected (§05) ↗
2. **Pedal 2 — Dispense** — feeds solder wire on its own, with no machine motion at all

Figure 06.1 — The pedals do very different things and look identical. Label them on day one.

Pedal 1 — running a joint

1. Hold the board or jig in position under the tip with both hands.
2. Press pedal 1 once and **let it go** (except in Manual mode, where you hold it).
3. Watch the display: ◆ `Auto Cycle` → ✦ `Soldering` bar → ✦ `Cooling` `Fan` bar → back to the menu.
4. The iron is back up and the counter has gone up by one. Move to the next joint.

> **Pressing again mid-cycle does nothing.** The controller is busy running the motors and only looks at the pedal between cycles — you cannot double-trigger a joint.

Pedal 2 — feeding wire by hand

Every tap pushes one **chunk** of wire out of the tip — by default 2 mm, set in **Machine Settings** (§12). The iron does not move. Use it to prime a fresh spool, to add a touch of solder to a joint that came out light, or as the wire supply in **Manual** mode.

PEDAL BEHAVIOUR	ONE TAP	HELD DOWN
Continuous (factory default)	One chunk	Keeps feeding, chunk after chunk, from about half a second in — until you lift your foot
Fixed chunk	One chunk	Still exactly one chunk. Holding does nothing

Switch between the two in Machine Settings → **Solder Pedal** (§12). Fixed-chunk is the safer choice for repeatable work; continuous is faster for loading a new spool.

> **Priming a new spool feeds a lot of wire.** Hold pedal 2 with the tip over a bin, not over the board.

The solder-point counter

Every completed cycle — down, dwell, up — adds one to a counter stored in the machine's flash. It survives power-off, is shown large on the dashboard (§08), and you can set it to any number or reset it to zero from there. Feeding wire with pedal 2 does **not** count; nor do the Test buttons.

Per-shift output

Note the number at the start and end of a shift — the difference is joints made.

Tip life

Tips are usually specified in thousands of joints. The counter is how you actually know.

Pedal trouble

SYMPTOM	LIKELY CAUSE	WHAT TO DO
Neither pedal does anything	The machine is locked	Unlock it (§03) — the display will be showing **DEVICE LOCKED**
Pedal 1 does nothing, pedal 2 works	Pedal 1 unplugged, or its lead is broken	Open the dashboard and press each pedal while watching the **Pedal Up/Dn** state pill (§08) — it should light
A cycle starts on its own	A stuck pedal, or the leads are swapped into the wrong sockets	Unplug both pedals; if it stops, the pedal is at fault
Pedal 2 feeds continuously	Pedal behaviour is set to **Continuous** and the pedal is sticking	Switch to **Fixed chunk** in Machine Settings (§12) to confirm, then replace the pedal
Both pedals do the same thing	The two leads are in the same socket group	Check the pin map — **Pedal Up/Down** and **Pedal Dispense** must be on different GPIOs (§14)

Setting the bench up for a shift

- **Pedal 1 under your stronger foot**, pedal 2 under the other. You will press pedal 1 hundreds of times a day and pedal 2 only occasionally.
- **Mark them.** A stripe of tape on pedal 1 is enough. Reaching for the wrong pedal mid-run costs a joint.
- **Dress the leads along the bench leg**, not across the floor where a chair will roll over them. Pedal leads are the commonest failure on any machine like this.
- **Sit square to the machine** — both hands should reach the work plate without leaning.
- **Keep the sponge and a spare tip within reach**, so wiping is a reflex and not an interruption.

Rhythm — what a good run feels like

STEP	YOU	THE MACHINE
1	Place the board, both hands	Idle, showing the settings
2	Press pedal 1 and release	Runs the whole cycle (§05)
3	Move to the next joint *while the fan runs*	Cooling
4	Press again	Next joint

Step 3 is where the time goes. Setting **Fan Time** to the length of time it actually takes you to reposition — rather than a round number — is usually worth more than any speed setting on the machine (§10, §12).

> **The counter is your stopwatch.** Note it at the start and end of an hour; the difference is your real joints-per-hour, including everything that slowed you down (§08).

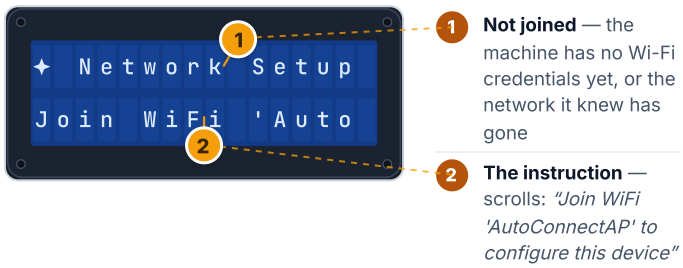
07 · WI-FI

Joining Wi-Fi & finding the dashboard

The machine hosts its own web page. Get it onto your network once and every browser in the workshop can reach it.

Getting it onto your Wi-Fi

1. Press **SET** around to page 6, **Network**. If it says **Network Setup**, the machine has no network yet.
2. On a phone or laptop, join the temporary hotspot the machine broadcasts: `AutoConnectAP`.
3. A setup page opens by itself (if not, browse to `192.168.4.1`).
4. Pick your workshop Wi-Fi from the list, type its password, save.
5. The machine restarts, joins, and page 6 changes to **Network Online** with an address.
6. Type that address into any browser on the same network. The dashboard opens (§08).

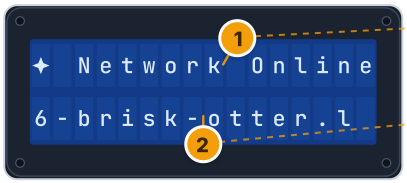


1. **Not joined** — the machine has no Wi-Fi credentials yet, or the network it knew has gone
2. **The instruction** — scrolls: *"Join WiFi 'AutoConnectAP' to configure this device"*

Figure 07.1 — Page 6 before the machine has a network.

> **2.4 GHz only.** The controller cannot see 5 GHz networks. If your router publishes both under one name, that is fine — it will join the 2.4 GHz half.

Its two addresses



1. **Joined** — the machine is on your Wi-Fi and serving its dashboard
2. **Its address** — scrolls the friendly name then the IP — e.g. `http://autosolder6-brisk-otter.local - IP 192.168.1.42`

Figure 07.2 — Page 6 once it is on the network. Type either address into a browser.

ADDRESS	LOOKS LIKE	NOTES
Friendly name	`autosolder6-brisk-otter.local`	Never changes for this machine — it is derived from the controller's own hardware address. Two AutoSolder 6s on one network always get different names.
IP address	`192.168.1.42`	Handed out by your router and may change when it restarts. Fine for a quick look, poor for a bookmark.

> Bookmark the **.local** name, not the IP. If `.local` will not resolve on your PC (some Windows setups), use the IP from page 6.

Moving the machine to a different network

Way 1 · from the dashboard

Open the dashboard and press the ≋ **Wi-Fi** button in the header, then **Reconfigure Wi-Fi** and confirm. The machine forgets the old network, restarts and brings the `AutoConnectAP` hotspot back up. Join it and pick the new network.

Way 2 · with the power switch

No dashboard reachable? Switch the machine **off and on five times in quick succession**, each within about eight seconds of the last. The display counts the presses for you. On the fifth it shows `✦ WiFi Cleared` and reboots into setup mode.

> This is the escape hatch for a machine that moved workshop and can no longer see the Wi-Fi it knew.

Wi-Fi is optional

AutoSolder 6 solders perfectly with no network at all. The display and the pedals do everything needed for production. Wi-Fi buys you the dashboard: calibration, hardware tests, backups, firmware updates and the HTTP API.

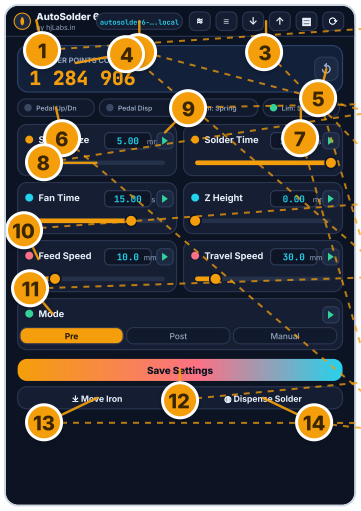
> Put the machine on your **workshop** network, not a guest network. Guest networks usually block devices from talking to each other, so the dashboard will not open.

PROBLEM	CAUSE	FIX
Page 6 still says **Network Setup** after setup	Wrong password, or a 5 GHz-only network	Repeat the setup; watch for a typo in the password
`AutoConnectAP` hotspot never appears	The machine already has credentials	Clear them: five quick power-cycles, or the dashboard button
Address in the browser times out	Your PC is on a different network or VLAN	Same Wi-Fi, same subnet. Try the IP address from page 6
`.local` name not found	mDNS is not resolving on your PC	Use the IP address instead
Dashboard loads then stalls	Weak signal at the bench	Move the machine or add an access point — steel enclosures are unkind to Wi-Fi

08 · THE DASHBOARD

The web dashboard — the home page

Open the machine's address in any browser and this is what you get: every parameter, the counter, live inputs and two big buttons.



1. **Machine name** — confirms you are looking at an AutoSolder 6, and not another machine on the bench
2. **Address chip** — the machine's own `.local` name — tap it to open by name (§07) ↗
3. **Tool buttons** — six panels live behind these: Wi-Fi · Machine Settings · Export · Import · API docs · Firmware — all of §09 ↗
4. **Solder-point counter** — every completed cycle since it was last reset. Click the number to type a new one
5. **Reset counter** — sets it back to zero
6. **Live state pills** — the two pedals and the two limit switches, refreshed continuously
7. **A lit pill** — means that input is active right now — press a pedal and watch it light (§14) ↗
8. **Slider & number** — drag or type — the two always agree. Nothing is applied until you press Save
9. **Test ▶** — runs **only** this parameter on the real hardware, with the value in the box beside it
10. **The two speeds** — feed and travel speed — parameters the panel cannot reach at all (§11, §12) ↗
11. **Mode** — the same Pre / Post / Manual as display page 4 (§05) ↗
12. **Save Settings** — writes all seven values into the machine. The display updates at the same moment
13. **Move Iron** — runs one full solder cycle from the browser — exactly as pedal 1 would (§06) ↗
14. **Dispense Solder** — feeds a burst of wire — five times the Solder Size — with no motion at all

Figure 08.1 — The dashboard as it opens. Everything on the display is here, plus the counter, the live input states, per-setting hardware tests and the two speeds.

Anatomy of a setting card

1. **Icon** — one per parameter, so a card is recognisable at a glance on a phone
2. **Name** — the same parameter the display calls `Solder` (§04) ↗
3. **ⓘ help** — hover or tap it for a one-line explanation, written into the firmware itself
4. **Typed value** — click and type an exact number — far quicker than dragging for 37.25
5. **Unit** — mm, s or mm/s. Every parameter here is in real-world units, never in motor steps
6. **Test ▶** — runs this one parameter, now, on the real machine (§14) ↗
7. **Slider** — drag for a feel of the range; it and the number are always the same value
8. **Range** — the firmware's hard limits — you cannot type past them

Figure 08.2 — One card, enlarged. All seven cards work the same way.

The seven cards on the home page

CARD	UNIT	RANGE	ON THE DISPLAY TOO?	WHAT IT CHANGES
Solder Size	mm	0.25 – 100	Yes — page 1	Length of wire fed per joint (§04)
Solder Time	s	0.25 – 10	Yes — page 2	How long the iron dwells on the joint (§04)
Fan Time	s	0 – 20	Yes — page 3	Cool-down after the joint; 0 = fan off (§04)
Mode	—	Pre/Post/Manual	Yes — page 4	Which cycle runs on a pedal press (§05)
Z Height	mm	0 – 50	Yes — page 5	Drop depth; 0 = down to the limit switch (§04)
Feed Speed	mm/s	0.5 – 50	**No**	How fast wire leaves the tip — the same parameter as Feed speed in Machine Settings (§10)
Travel Speed	mm/s	1 – 200	**No**	How fast the iron rises and falls — the same as Travel speed (§12)

The three live regions

REGION	REFRESHES	WHAT IT TELLS YOU
Counter	Continuously	Completed cycles, stored in flash. Click the number to set it; ↺ to zero it (§06)
State pills	Continuously	Both pedals and both limit switches as they are **right now** — the fastest fault-finding tool on the machine (§14)
Card values	On load & save	What the machine will actually do on the next pedal press

Because the counter and the pills are polled from the machine, several people can have the page open at once and all see the same numbers. The page is served **by the machine** — it works with no internet connection at all.

The two action buttons

BUTTON	EQUIVALENT TO	NOTES
Move Iron	One press of pedal 1	Runs the complete cycle in the current mode — feed, down, dwell, up, fan — and counts as a solder point
Dispense Solder	A long hold of pedal 2	Feeds five times the Solder Size in one burst. Nothing moves; the counter does not change

Move Iron and every Test ▶ drive the real machine immediately, with no countdown and no confirmation. Check that nothing — and nobody — is under the tip before you press one.

09 · DASHBOARD TOOLS

The dashboard's tools — every panel behind the header

Six buttons in the header open the rest of the web interface: Wi-Fi, machine parameters, backup, restore, the API reference and firmware.

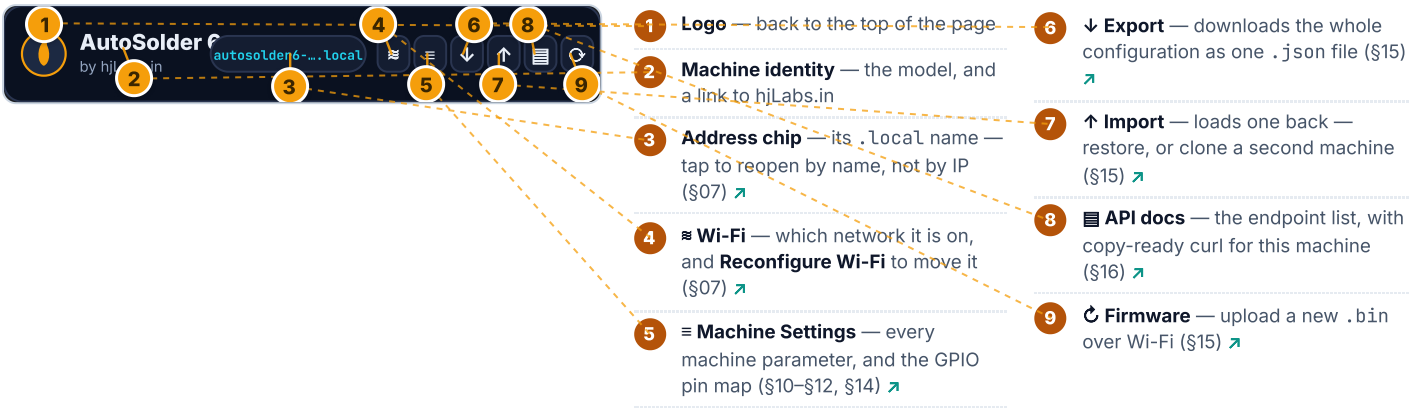


Figure 09.1 — The header: six buttons, six panels. This strip is the whole of the web interface beyond the home page.

What is behind each button

BUTTON	PANEL	YOU GO THERE TO…	NEEDS UNLOCKING?
≋ Wi-Fi	Its own page, at `/wifi`	See the machine's address, and press **Reconfigure Wi-Fi** to send it back to setup mode for a different network (§07)	To reconfigure
≡ Machine Settings	A large panel in two halves	Top: every machine parameter (§10–§12). Bottom: the GPIO pin map and the hardware self-tests (§14)	To save
↓ Export	An immediate download	Saves `autosolder6-config.json` — settings, parameters and pin map (§15)	No
↑ Import	A file-chooser dialog	Push a saved configuration back, or onto a second identical machine (§15)	Yes
▤ API docs	A reference panel	Every HTTP endpoint, with a copy button that fills in **this machine's** address (§16)	No
↻ Firmware	Upload + progress bar	Flash a new build over Wi-Fi — no cable, no programmer (§15)	Back up first

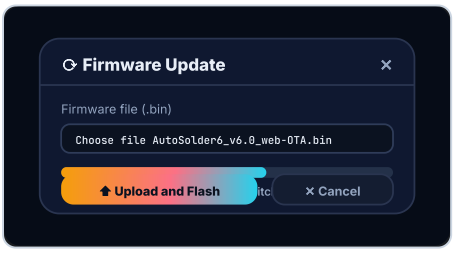


Figure 09.2 — **Firmware Update**. Choose a `.bin`, press Upload & Flash. The machine reboots by itself at 100 % (§15).

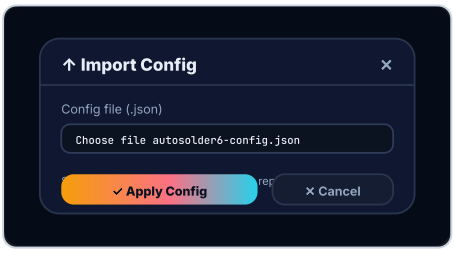


Figure 09.3 — **Import Config**. Everything in the file replaces what is on the machine — the pin map included (§15).

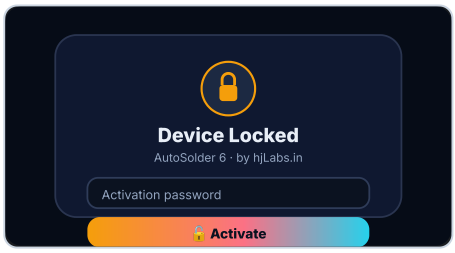


Figure 09.4 — The lock overlay covers the whole page until a never-activated machine is unlocked (§03).

Things the interface does quietly

BEHAVIOUR	WHAT YOU WILL NOTICE
Splash screen	A one-off hjLabs.in → AutoSolder 6 animation while the page loads. It fades by itself
Toast messages	A dark bar slides up from the bottom to confirm a save, a test or an error
Works offline	Layout, panels and scripts are all served by the machine — only the icon font comes from the internet, with a plain-text fallback
No login	Beyond the activation lock there is no user account — anyone who can reach the machine can drive it (§16)
Immediate effect	Saving on the web page updates the physical display in the same instant, and it clamps out-of-range values rather than accepting them (§14)

Using the interface safely

- **Export before you change anything structural** — one click now, no re-calibration later (§15).
- **Change one parameter at a time**, then run a test joint.
- **Test ▶ before Save** — the test buttons use the value in the box, saved or not (§13).
- **Keep the machine off the internet**, and off a shared PC where somebody might lean on **Move Iron**.

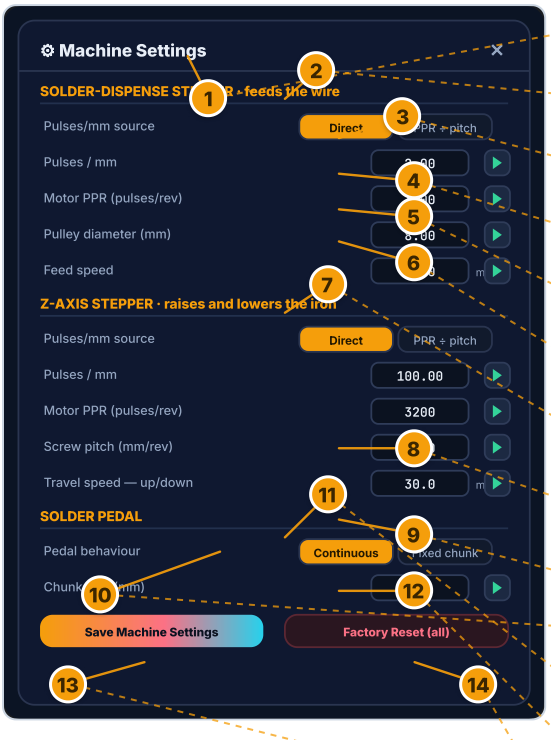
Factory Reset (all) lives at the bottom of Machine Settings. It restores the five settings, every calibration value and the whole pin map in one press. Your counter and your unlock survive it, but nothing else does.

Two machines, one setup
Commission machine 1 properly, Export, then Import onto machine 2 — both then make the same joint (§15).

10 · PARAMETERS · THE PANEL

Machine parameters — the panel

These are the numbers that tell the machine about its own mechanics. Set them once, correctly, and every millimetre you ask for afterwards is a real millimetre.



1. **Machine Settings** — opened with the ≡ button in the dashboard header (§09). These are the machine's own **mechanics** — not your day-to-day settings ↗
2. **Wire-feed section** — everything about how far and how fast solder wire moves — the full reference is §11 ↗
3. **Pulses/mm source** — **Direct** = you type pulses per millimetre. **PPR ÷ pitch** = the machine derives it from the motor and the pulley
4. **Pulses / mm** — the feeder's calibration number: step pulses that push one millimetre of wire (§11) ↗
5. **Motor PPR** — full steps × microsteps per revolution — a 200-step motor at 16× microstepping is 3200
6. **Pulley diameter** — in PPR ÷ pitch mode: wire per turn is π × diameter, so the machine works pulses/mm out itself
7. **Feed speed** — how fast wire leaves the tip, in **millimetres of wire per second** — a real speed, whatever the gearing (§11) ↗
8. **Z-axis section** — how far and how fast the iron travels up and down — the full reference is §12 ↗
9. **Screw pitch** — millimetres the Z axis moves per turn of the lead screw (§12) ↗
10. **Test ▶** — every row has one. It moves the real motor the real distance **at the value in the box**, saved or not (§13) ↗
11. **Pedal section** — what pedal 2 does: feed continuously while held, or one fixed chunk per tap (§12) ↗
12. **Chunk size** — how much wire one tap of pedal 2 delivers (§12) ↗
13. **Save Machine Settings** — writes the whole panel into the machine. **Nothing above takes effect until you press this**
14. **Factory Reset (all)** — settings, parameters and the pin map back to the shipped values. The counter and the unlock survive it

Figure 10.1 — Machine Settings, the upper half. You will open this when you commission the machine, when you change a motor, a pulley or a lead screw — and almost never otherwise. The lower half of the same panel is the GPIO pin map (§14).

Two kinds of number, kept apart on purpose

	OPERATING SETTINGS	MACHINE PARAMETERS
Where	Display pages 1–5 and the home cards (§04, §08)	The Machine Settings panel — §10, §11, §12
Examples	Solder Size, Time, Fan, Mode, Z Height	Pulses/mm, PPR, pitch, speeds, chunk size
How often	Between jobs — several times a day	Once at commissioning; then only if the mechanics change
Units	mm and seconds of **your work**	The machine's own mechanics
If it is wrong	The joint looks wrong	**Every** millimetre on the machine is wrong
Who changes it	The operator	Whoever commissions or repairs the machine

A wrong **pulses/mm** does not make one setting wrong — it makes *every* distance wrong at once. That is why these live behind their own panel, and why §13 is a whole page on measuring them properly.

Why the speeds are in mm/s

Older firmware asked for motor *steps* per second, so every change of pulley or microstepping silently changed the real speed. This firmware stores **millimetres per second** and converts to step pulses at the moment of movement. Set 10 mm/s and you get 10 mm of wire every second — whatever is fitted.

The three rules of this panel

1. **Nothing takes effect until you press Save.** You can change every field on the page and walk away, and the machine will still behave exactly as it did.
2. **Every Test ▶ uses what is on screen, saved or not.** That is deliberate — it is what makes calibration a two-minute job instead of a save-and-hope loop (§13).
3. **Change one thing, test, then save.** Two changes at once and you cannot tell which one helped.

Factory Reset (all) sits at the bottom of this panel. It restores the five operating settings, every parameter on §11 and §12, and the whole GPIO pin map — in one press, with one confirmation. Export a backup first (§15).

11 · PARAMETERS · FEEDER

Machine parameters — the wire feeder

Five numbers decide how much solder wire the machine pushes, and how fast. Get the first of them right and every other setting on the machine starts telling the truth.

Wire-feeder parameters — the complete reference

PARAMETER	FACTORY	RANGE	UNIT	WHAT IT MEANS, AND WHEN TO CHANGE IT
Pulses/mm source	Direct	Direct · PPR ÷ pitch	—	How the feeder's pulses/mm is arrived at. **Direct** = you supply the number, and that number is what §13 measures. **PPR ÷ pitch** = the machine computes it as PPR ÷ (π × pulley diameter). Choose PPR ÷ pitch if you would rather describe the hardware than measure it — but measurement wins every time.
Pulses / mm	2.00	> 0	pulses/mm	Step pulses that push one millimetre of solder wire. **The single most important number on the machine** — it is what makes a Solder Size of 5 mm actually deposit 5 mm of wire. Change it when what comes out does not match what you asked for (§13).
Motor PPR	3200	≥ 1	pulses/rev	Motor full steps × driver microsteps. A 1.8° motor is 200 full steps; at 16× microstepping that is 3200. Used only in PPR ÷ pitch mode. Change it when you move the driver's microstep switches, or fit a different motor.
Pulley diameter	8.00	> 0	mm	The **diameter** of the knurled feed pulley — not its circumference. Wire per turn is π × diameter. Used only in PPR ÷ pitch mode. Change it when you fit a different pulley.
Feed speed	10.0	0.5 – 50	mm/s	How fast solder wire leaves the tip. Also on the home page as **Feed Speed** — the same parameter in two places, so changing either changes both (§08).

Where pulses/mm comes from

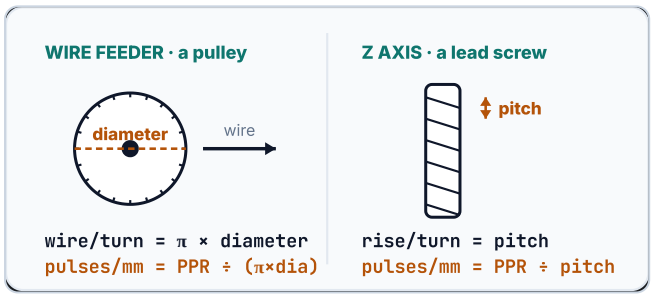


Figure 11.1 — In **PPR ÷ pitch** mode the machine does this arithmetic for you. The feeder's pulley delivers its **circumference** per turn, so π appears; the Z axis's lead screw delivers its **pitch**, so it does not (§12). Measuring instead (§13) sidesteps both formulas — and catches slip, backlash and the knurl biting into the wire, which no formula can.

Tuning the feed speed

WHAT YOU SEE	MOVE FEED SPEED
The wire buckles or curls inside the guide tube	**Down**, in 2 mm/s steps, until it runs straight
Wire piles up on the pad instead of melting in	**Down** — it is arriving faster than the joint can wet it
The feed step is the slow part of the cycle	**Up**, until buckling starts, then back off about 20 %
Solder length varies from joint to joint	Speed is rarely the cause — check the guide tube and the drive pressure first, then re-calibrate (§13)

> **Feed speed has its own Test ▶**, both here and on the home page. It feeds exactly one **Solder Size** of wire at the speed in the box, so you can hear and see the effect before committing to it.

If you change the wire

Pulses/mm does **not** change when you swap to a different wire diameter — a millimetre of wire is still a millimetre. What changes is how much *metal* that millimetre carries, so your **Solder Size** (§04) will need re-testing. Going from 0.8 mm to 1.0 mm wire deposits roughly 55 % more solder for the same setting.

> Only **Pulses / mm** is used when the source is **Direct**; only **Motor PPR** and **Pulley diameter** are used in **PPR ÷ pitch** mode. The unused fields stay on screen but do nothing — so check which mode you are in before you blame a number.

Worked examples — the same feeder, described three ways

THE HARDWARE	SOURCE	WHAT YOU TYPE	RESULTING PULSES/MM	FEED A 5 MM SHOT
Factory build, measured on the bench	**Direct**	Pulses / mm = **2.00**	2.00	10 step pulses
200-step motor, 16× microstepping, 8 mm pulley	**PPR ÷ pitch**	PPR = **3200**, pulley diameter = **8.00**	3200 ÷ (π×8) = **127.3**	637 pulses
The same, but geared 64:1 down to the pulley	**Direct**	measure it — do not guess	whatever §13 gives you	—

The middle row is the point of the two modes: a bare motor on a pulley is easy to describe, and the formula gets within a percent. The moment a gearbox, a spring-loaded idler or a knurl that bites into soft wire is in the path, only **measurement** (§13) is right — which is why the factory value is **Direct**. And pulses/mm can be a fraction: 2.17 is a perfectly good value, so do not round it to 2.

12 · PARAMETERS · Z & PEDAL

Machine parameters — Z axis & the solder pedal

The other half of the panel: how far and how fast the iron moves, what the dispense pedal does — and an index from what you can see to the parameter that fixes it.

Z-axis parameters — how far and how fast the iron moves

PARAMETER	FACTORY	RANGE	UNIT	WHAT IT MEANS, AND WHEN TO CHANGE IT
Pulses/mm source	Direct	Direct · PPR ÷ pitch	—	The same choice the feeder has. In PPR ÷ pitch mode the machine computes pulses/mm = PPR ÷ screw pitch — a lead screw advances by its pitch per turn, so there is no π on this side (Figure 11.1).
Pulses / mm	100.00	> 0	pulses/mm	Step pulses per millimetre of vertical travel. This is what makes a **Z Height** of 3 mm actually 3 mm. Change it when the measured drop does not match the setting (§13).
Motor PPR	3200	≥ 1	pulses/rev	Z motor full steps × driver microsteps. Used only in PPR ÷ pitch mode.
Screw pitch	2.00	> 0	mm/rev	How far the lead screw advances in one turn. Read it off the screw specification — a common T8 screw is 2 mm/rev single-start and 8 mm/rev four-start. Used only in PPR ÷ pitch mode.
Travel speed	30.0	1 – 200	mm/s	How fast the iron rises and falls. Too fast and the head arrives hard and bounces on the limit switch; too slow and the joint waits. Also on the home page as **Travel Speed** (§08).

Solder-pedal parameters — what pedal 2 does

PARAMETER	FACTORY	RANGE	UNIT	WHAT IT MEANS, AND WHEN TO CHANGE IT
Pedal behaviour	Continuous	Continuous · Fixed chunk	—	**Continuous** keeps feeding chunk after chunk from about half a second into the press — fast for priming a new spool. **Fixed chunk** gives exactly one chunk per tap however long you hold it — repeatable for touch-ups (§06).
Chunk size	2.0	≥ 0.1	mm	How much wire one tap of pedal 2 delivers. Set it to what a typical touch-up on your boards needs, so that one tap is one dose.

Which parameter do I change?

WHAT YOU SEE	THE PARAMETER
Wire length never matches Solder Size	Feeder **Pulses / mm** (§11, §13)
Wire buckles in the guide tube	**Feed speed** — down (§11)
Wire piles on the pad instead of melting in	**Feed speed** — down (§11)
Feeding is the slow part of the cycle	**Feed speed** — up (§11)
Z drop never matches Z Height	Z **Pulses / mm** (§13)
Head arrives with a bang, or bounces	**Travel speed** — down
Motor stalls or buzzes on the way down	**Travel speed** — down
Cycles feel sluggish between joints	**Travel speed** — up
Pedal 2 keeps feeding while you hold it	**Pedal behaviour** → Fixed chunk
A touch-up needs two or three taps	**Chunk size** — up
You changed the driver's microstep switches	**Motor PPR**, then re-calibrate (§13)
You fitted a new pulley or lead screw	**Pulley diameter** / **Screw pitch**, then re-calibrate (§13)

Travel speed and the limit switches

With **Z Height** at 0 the machine drives down until a limit switch trips (§04). That switch has to be read while the motor is running, so a very high travel speed gives the controller less distance in which to notice — the head lands harder and repeatability suffers. If your joints vary in how firmly the tip presses, lower the travel speed before you change anything else.

> **The machine measures its own return.** It counts the steps taken on the way down and returns exactly that many — so it handles boards of different thicknesses without being told, and travel speed never affects where the head ends up (§05).

Two parameters, two places

Feed speed and **Travel speed** appear both here and as cards on the dashboard home page. They are the same parameter — change either and both move. Everything else on §11 and §12 exists only in the Machine Settings panel.

> After **any** change on this page or the last one, run a test joint on scrap before production. A parameter change can move every distance the machine makes, all at once.

13 · CALIBRATION

Calibrating the machine — by measurement

Ask for a known distance, measure what you got, scale the number, repeat once. That is the whole method, and it beats any datasheet.

Why calibrate at all

Your machine left hjLabs.in calibrated. You will need this page when something mechanical changes — a new feed pulley, a different motor, new driver microstep settings, a replacement lead screw — or when you notice that the wire coming out no longer matches the number you typed.

There are two ways to get pulses/mm right, and the second one is the one to trust:

METHOD	HOW	ACCURACY
By description	Switch the source to **PPR ÷ pitch** and describe the hardware — motor PPR, and the pulley diameter or the screw pitch. The machine does the arithmetic	As good as your numbers. Slip, backlash and a knurl biting into the wire are not in the datasheet
By measurement	Ask for a known distance, measure what you actually got, and scale the number	The truth. This is the method below

Test ▶ uses what is on screen, not what is saved. That is what makes this quick: type a candidate number, test it, measure, adjust, and only save when the measurement agrees.

Calibrating the wire feed

1. Machine Settings → feeder → set **Pulses/mm source** to **Direct**.
2. On the home page set **Solder Size** to **100 mm** — a long test measures far more accurately than a short one.
3. Snip the wire off flush at the tip, and put a bin under it.
4. Press the **Test** ▶ beside Solder Size. Wire feeds out.
5. Measure the piece that came out with a rule. Say you asked for 100 mm and got **92 mm**.
6. New pulses/mm = old × (asked ÷ got) = 2.00 × (100 ÷ 92) = **2.17**.
7. Type 2.17 into **Pulses / mm**, press **Save Machine Settings**, and repeat from step 3.
8. Two rounds normally brings you inside a millimetre in a hundred. Put **Solder Size** back to your working value.

```
new_pulses_per_mm = old_pulses_per_mm × ( asked_mm ÷ measured_mm )
```

Calibrating the Z axis

1. Machine Settings → Z axis → set **Pulses/mm source** to **Direct**.
2. Clear the work plate completely, and put a steel rule alongside the head with a mark at the tip's resting height.
3. On the home page set **Z Height** to **20 mm** — not 0, which would mean "go until a switch stops you".
4. Press the **Test** ▶ beside Z Height. The head goes down and comes straight back up.
5. Measure the travel. If you asked for 20 mm and it moved **21.5 mm**, the axis is over-travelling.
6. New pulses/mm = 100.00 × (20 ÷ 21.5) = **93.0**.
7. Type it in, **Save**, and test again.
8. **Set Z Height back to 0** when you have finished, so the machine goes back to stopping on the limit switch (§04).

Never calibrate Z with a board under the tip. A wrong pulses/mm can send the head much further than you asked, and in fixed-height mode there is no switch to catch it.

Tuning the two speeds

SYMPTOM	PARAMETER	MOVE IT
Wire buckles or curls in the guide tube	Feed speed	**Down**, in 2 mm/s steps, until it runs straight
Wire piles on the pad instead of melting in	Feed speed	**Down** — the wire is arriving faster than it can wet
The feed step is the slow part of the cycle	Feed speed	**Up**, until buckling starts, then back off 20 %
Head arrives with a bang, or bounces	Travel speed	**Down**. It also makes the limit switch trip more consistently
Motor stalls or buzzes on the way down	Travel speed	**Down** — you are past what the motor can drive
Cycles feel sluggish between joints	Travel speed	**Up**, a little at a time, testing after each step

Both speeds have a **Test** ▶ of their own that moves the real motor one real Solder Size or one real Z Height at the speed in the box — so you can hear and see the effect before you commit to it.

Write it down

Note your final pulses/mm on the machine record at the end of §17, and Export a backup (§15). Recovering these numbers from scratch takes an afternoon.

Change wire, re-test

A different diameter or alloy changes how much metal a millimetre of wire is. Pulses/mm does not change — but your Solder Size will need to (§04).

14 · GPIO & SELF-TESTS

The pin map & proving the hardware

Every wire on the machine is named in software, and every one of them can be tested on its own from the browser.

1. **GPIO Pin Mapping** — the lower half of the Machine Settings panel (§09) — the machine's whole wiring, in software ↗
2. **The signal** — what the wire does, not where it goes. There are twelve: five inputs, two limit switches, the fan relay, and two step/direction pairs
3. **The pin** — which controller pin it is on. Pick from the drop-down; the machine refuses duplicates outright
4. **Capability warning** — **input-only** pins can never drive an output; **strapping** pins affect how the controller starts up. The list warns you before you choose one
5. **Test ▶** — toggles an output, or reads an input live, so you can prove one wire at a time
6. **Save Pin Mapping** — re-wires the machine immediately — motors and buttons move to their new pins with no restart

Figure 14.1 — GPIO Pin Mapping. You should never need this on a machine that works. It exists so a machine that was wired differently, or repaired, can be put right without a programmer.

The factory wiring

SIGNAL	PIN	KIND	WHAT IT IS
Pedal Up/Down	26	input	Pedal 1 — runs a cycle
Pedal Dispense	33	input	Pedal 2 — feeds wire
Button Up	13	input	Red panel button
Button Down	18	input	Green panel button
Button Set	14	input	Blue panel button
Limit: Spring	34	input-only	The spring-loaded head has touched down
Limit: Screw	5	input	The lead screw has reached its lower stop
Fan Relay	19	relay	Switches the cooling fan
Dispense STEP / DIR	25 / 27	step / out	Wire-feed motor
Z-Axis STEP / DIR	23 / 2	step / out	Up-down motor

Some pins on the controller are **input-only** and have no internal pull-up — the machine already fits the external resistor those need. The list marks them, refuses to put an output on one, and protects the display's own pins from being reassigned at all.

Proving the hardware — the three self-tests

THE TEST	WHAT IT PROVES
Live state pills dashboard, §08	Both pedals and both limit switches, as they are right now. Press a pedal, or push the head down by hand, and the matching pill should light. If it does not, the fault is between the switch and the controller — not in the firmware
Test ▶ on a pin pin map, this page	On an output it pulses the pin — you should hear the fan relay click. On an input it reads the pin back. The quickest way to tell a dead switch from a dead wire from a wrong pin number
Test ▶ on a motor Machine Settings, §11	Moves a real motor a real distance at the speed in the box, **using the values on screen, saved or not**. Type a number, test, measure, adjust, save (§13)

Do not go exploring here. A wrong pin can leave the machine unable to see a limit switch — which is exactly the thing that stops the iron. Change one row, test it, save, then move on.

Diagnosing by symptom

SYMPTOM	TEST THAT FINDS IT	USUAL CAUSE
The wrong motor moves	Motor **Test ▶** for Dispense and for Z, one at a time	The Z and Dispense step/direction pins are swapped relative to the wiring — swap them back in the pin map
A motor moves the wrong way	The same test, watching the direction	The direction pin, or the motor's coil pairs, are reversed
The iron never stops going down	Push the head up by hand and watch **Limit: Spring**	A limit switch is not reaching the controller. The 20-second timeout is what saved the board
The fan never runs	**Test ▶** on Fan Relay — listen for the click	No click: relay or pin. Click but no air: the fan's own supply
A panel button does nothing	There is no pill for the buttons — **Test ▶** the pin instead	Broken button lead, or the pin was remapped
Nothing at all responds	Read the display	The machine is locked (§03) — every action endpoint refuses while locked

15 · BACKUP & FIRMWARE

Backup, cloning & firmware updates

One file holds a machine's whole personality; one upload replaces its brain. Both go through the same browser page.

Backing a machine up

The ↓ **Export** button in the dashboard header (§09) downloads one small file — `autosolder6-config.json` — holding everything that makes this machine behave the way it does:

SAVED IN THE FILE	NOT SAVED
The five operating settings — Solder, Time, Fan, Type, Z-Hgt (§04)	The solder-point counter
Every machine parameter — pulses/mm, PPR, pitch, speeds, pedal behaviour (§10–§12)	The unlock / activation state
The complete GPIO pin map (§14)	The Wi-Fi network name and password

It is plain text — you can open it, read it and keep it with your process documents. Export a machine the day it is commissioned, and again after any change you would hate to redo.

Restoring, or cloning to a second machine

1. Open the target machine's dashboard and press ↑ **Import**.
2. Choose the `.json` file and press **Apply Config**.
3. The machine takes the settings, every parameter and the pin map, then reloads.
4. Run one test joint before production — a clone is not a substitute for a check.

A clone copies the pin map too. If the second machine is wired differently, its motors will move to the first machine's pins. Only clone between machines you know are built the same (§14).

Import needs the machine unlocked (§03) — it writes parameters, and every writing endpoint is gated.

Two machines, one recipe
Commission machine 1 properly, Export, Import onto machine 2 — and both make the same joint.

Before every firmware update
Export first. It costs two minutes and can save an afternoon of re-calibration (§13).

What the backup file looks like

```
{
  "type": "autosolder6-config",
  "version": 1,
  "settings": { "Solder Size": 5.00, "Solder Time": 1.50,
    "Fan Time": 2.00, "Type": 1, "Z Height": 0.00 },
  "config":   { "dispPulsesPerMm": 2.17, "dispSpeed":
10.0,
    "zPulsesPerMm": 93.0, "zProbeSpeed": 30.0, … },
  "pins":     { "pedalUpDn": 26, "zStep": 23, … }
}
```

Plain, readable JSON — you can open it in any text editor to check a number without going near the machine, and diff two machines against each other to see exactly where they differ.

Updating the firmware over Wi-Fi

New firmware arrives from hjLabs.in as a single `.bin` file. No programmer, no cable, no software to install — it goes in through the same browser page (Figure 09.2).

1. **Export your configuration first** (left).
2. Press the ↻ **Firmware** button in the dashboard header.
3. Choose the `.bin` file and press **Upload & Flash**.
4. A progress bar runs. **Do not switch the machine off, and do not close the tab.**
5. At 100 % the machine reboots itself. The display plays its start-up animation again (§01).
6. Reload the dashboard, check your parameters survived, and run a test joint.

Never power-cycle a machine mid-upload. A half-written firmware leaves the controller unable to start, and recovering it needs a cable and a programmer at hjLabs.in.

IF…	THEN
The upload fails part-way	The machine keeps the firmware it had. Reload the page and try again, closer to the access point
It reboots to a blank display	Power-cycle once. If the display stays blank but the dashboard answers, it is the display cable, not the update (§17)
Your parameters look wrong afterwards	Import the backup you exported in step 1
The machine will not come back at all	Contact hjLabs.in with the file name and version you flashed (§17)

Ask before you flash
There is no automatic update check. Ask hjLabs.in for the current build for **your** machine — quote its serial.

If it works, leave it
A soldering machine in production owes you nothing new. Update to fix something, not out of habit.

A backup discipline that actually works

WHEN	FILE NAME	WHY
The day it is commissioned	`as6-<serial>-commissioned.json`	The known-good state. Never overwrite this one
After any calibration (§13)	`as6-<serial>-YYYY-MM-DD.json`	So you can go back one step, not all the way
Before every firmware update	`as6-<serial>-pre-fw<ver>.json`	The one you will actually need
After re-wiring (§14)	`as6-<serial>-pinmap.json`	Pin maps are the hardest thing to reconstruct from memory

Keep the files with your process documents, not on the machine's bench PC. A workshop PC is the one thing more likely to fail than the machine.

Importing does not merge — it replaces. Every setting, every parameter and every pin assignment in the file overwrites what is on the machine. There is no partial import and no undo, so read the file before you apply it to a working machine.

16 · THE HTTP API

Driving the machine from software

Everything the dashboard does, it does over plain HTTP — so anything on your network can do it too.

Every button on the dashboard is a plain HTTP request. That means anything that can make an HTTP request — a shell script, a line of Python, a PLC, a test rig, your own dashboard — can drive AutoSolder 6. No SDK, no library, no cloud account. The machine carries its own copy of this list behind the ▤ **API** button (§09), always matching the firmware actually installed, with a copy button that fills in the right address for you.

Actions — make the machine do something

METHOD & PATH	WHAT IT DOES
`POST /moveServo`	Runs one complete solder cycle with the saved settings — exactly what pedal 1 does, and it counts (§05)
`POST /dispenseSolder`	Feeds a burst of wire — five times the current Solder Size. No motion, no count

Settings & machine parameters

METHOD & PATH	WHAT IT DOES
`POST /updateSettings`	Sets the five operating values. Fields: `Solder Size`, `Solder Time`, `Fan Time`, `Type` (1 = Pre, 2 = Post, 3 = Manual), `Z Height` (§04)
`GET /getConfig`	Every machine parameter as JSON — pulses/mm, PPR, pitch, speeds, pedal behaviour (§10–§12)
`POST /updateConfig`	Writes those same parameters back
`GET /export`	Downloads the full backup file (§15)
`POST /factoryReset`	Settings, parameters and pin map back to factory

State, counter, pins & tests

METHOD & PATH	WHAT IT DOES
`GET /getStates`	Live JSON: both pedals, both limit switches, and the counter (§14)
`GET /getCount`	The solder-point counter on its own
`POST /setCount` · `/resetCount`	Set it to a number, or zero it (§06)
`GET /getPins` · `POST /updatePins`	Read and write the GPIO map (§14)
`POST /testPin` · `/testMotor` · `/testParam`	The hardware self-tests behind every Test ▶ button (§14)
`GET /getIP` · `GET /getHost`	The machine's address and its `.local` name (§07)
`POST /wifiReset`	Forget the Wi-Fi and reboot into setup mode (§07)
`POST /update`	Firmware upload (§15)

What you get back

CODE	MEANS	DO THIS
200	Done — plain text, or JSON on read endpoints	Carry on
303	`/updateSettings` redirects back after saving	Follow it, or ignore it in a script
400	A parameter was missing or unparseable	Check the field names — case- and space-sensitive
403	`Device locked`	Unlock the machine (§03), then retry
no reply	Mid-cycle, or off the network	A cycle blocks the server until it ends — allow a generous timeout

Worked examples

Solder one joint:

```
curl -X POST http://autosolder6-brisk-
otter.local/moveServo
```

Set the machine up for heavy pads, then solder:

```
curl -X POST http://<machine>/updateSettings \
  -d "Solder Size=7.5" -d "Solder Time=3.0" \
  -d "Fan Time=3" -d "Type=1" -d "Z Height=0"
curl -X POST http://<machine>/moveServo
```

Read the live state and the counter:

```
curl http://<machine>/getStates
{"pedalUpDn":0,"pedalDisp":0,
 "limSpring":0,"limScrew":1,
 "count":1284906}
```

Push a calibrated pulses/mm onto a machine:

```
curl -X POST http://<machine>/updateConfig \
  -d "dispPulsesPerMm=2.17" -d "dispSpeed=10" \
  -d "zPulsesPerMm=93.0" -d "zProbeSpeed=30"
```

Back a machine up from a script:

```
curl -o backup.json http://<machine>/export
```

Every action and every write is refused while the machine is locked — you get `403 Device locked - activate it first`. Read-only calls such as `/getStates` keep working. Unlock the machine first (§03).

There is no authentication beyond the lock. Anyone who can reach the machine on your network can command it. Keep AutoSolder 6 on a workshop network you control, and never expose it to the internet.

Line integration

A conveyor or indexer can trigger `/moveServo` at each station and read `/getStates` to know the machine is idle before it moves the work.

Production logging

Poll `/getCount` once a minute and you have a joints-per-hour chart with no extra hardware.

A safe automation loop

The controller runs one thing at a time: while a cycle runs it is driving motors, not answering HTTP. `/moveServo` therefore **returns when the cycle is finished**, not when it starts — so your client's timeout must comfortably exceed `Solder Time + Fan Time` plus travel.

```
for part in parts:
  jig.move_to(part)
  r = requests.post(f"http://{M}/moveServo", timeout=30)
  r.raise_for_status()  # 403 == machine locked
```

- **Do not fire and forget** — wait for the 200 before moving the work; the iron is still down until then.
- **Set the parameters once** at the start of a batch, not before every joint.

17 · CARE & SUPPORT

Care, troubleshooting & support

A soldering machine is a consumable-driven tool. Look after the tip and the wire path and the rest looks after itself.

Daily & weekly care

WHEN	DO THIS
Every start-up	Wipe and re-tin the tip; check the wire runs freely off the spool and the guide tube is not kinked
Every few hours	Wipe the tip again — a dry, oxidised tip is the commonest cause of a bad-looking joint
End of shift	Switch off at the mains; leave the tip tinned — bare copper oxidises overnight
Weekly	Brush solder splash off the work plate and out of the fan guard; check the pedal leads for damage
Monthly	Check every screw on the column and head; look at the drive pulley for embedded solder dust
On tip change	Note the counter reading (§08) — that is your real tip life
After any mechanical change	Re-calibrate (§13) and Export a fresh backup (§15)

Always switch off at the mains before opening the base or touching anything inside. The supply and the motor drivers are live in there, and the capacitors hold charge briefly after switch-off.

Consumables & spares

PART	NOTE
Soldering-iron tip	Standard replaceable tip. Keep a spare; a worn tip degrades joints long before it fails
Solder wire	Rosin-core, 0.8 mm typical. A different diameter changes what Solder Size means — re-test (§04)
Foot pedals	Ordinary momentary pedals — the commonest thing to wear out on a machine like this
Cooling fan	40 mm. If it becomes noisy, replace it before it stalls

Troubleshooting, by what you see

SYMPTOM	CAUSE	FIX
Dull grey ball that never wetted	Not enough heat, or an oxidised tip	Wipe and re-tin the tip; raise **Time** a little (§04)
Joint is starved and concave	Too little wire	Raise **Solder Size** (§04); if the number is right but the wire is short, re-calibrate (§13)
Blobs and bridges	Too much wire, or too long a dwell	Lower **Solder Size**, then **Time** (§04)
Solder length varies joint to joint	The feeder is slipping, or the wire is snagging	Clear the tube, check drive pressure and that the spool turns freely, then re-calibrate (§13)
Every distance is wrong by the same ratio	pulses/mm is wrong	Calibrate by measurement (§13)
Tip presses hard into the board	Fixed **Z-Hgt** too deep	Set **Z-Hgt** to **0** and let the limit switch decide (§04)
Iron creeps down, then stops after ~20 s	No limit switch is being reached	That was the safety timeout — test both limit switches (§14)
Head bangs down, or wire buckles	Travel or feed speed too high	Lower **Travel speed** or **Feed speed** (§11, §12)
Fan never runs	**Fan Time** is 0, or the relay is dead	Set a Fan Time; then Test ▶ the fan relay (§14)
Display blank, or showing nonsense	The display cable is loose, or picking up motor noise	The machine keeps working by design — reseat the cable away from the motor leads
Wrong motor moves	Pin map does not match the wiring	Swap Z and Dispense step/dir in the pin map (§14)
Nothing responds · dashboard unreachable	Locked, or not on the network	Unlock it (§03); read display page 6 (§07)

Getting help

Contact hjLabs.in

+91 70165 25813 · hemangjoshi37a@gmail.com · **hjLabs.in** — GIDC Gandhinagar (GEZIA), Gujarat, India · MSME registered

Have this ready

Your machine's **serial**, the firmware version, what the **display** says, your exported configuration (§15) and a photo of a bad joint.

Remotely we can

Read your exported parameters, send a firmware build, and walk you through the self-tests (§14) on a call.

Machine record — fill this in once; your calibration numbers come from §13.

SERIAL / MACHINE NO.	COMMISSIONED ON	NETWORK NAME (.LOCAL)	FIRMWARE VERSION
WIRE DIAMETER & ALLOY	**PULSES/MM — FEED**	**PULSES/MM — Z**	**LAST TIP CHANGE (COUNT)**