HTS Heated Tip Syringe User Manual

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Heated Tip Syringe (HTS) System User Manual

Document Information

Product	HTS System Kit Gen 2
Part Number	CX2399-01A
Controller Model	HTS-C2424B (CX2400-01A)
Applicable Firmware	0.1.6 and later
Document Version	1.0
Prepared by	Croxel, Inc.

1. About this Product

The HTS (Heated Tip Syringe) is a precision localized-heating instrument intended for use in industrial and manufacturing environments where only the tip of a tool or applicator requires temperature control. The HTS heats a small target zone to a precise setpoint in seconds while surrounding materials remain at ambient temperature.

A complete HTS system consists of three connected items: the **controller**, the **smart holder**, and the **handpiece**. The controller is the central unit with a display and a control knob. The handpiece is held by the operator and delivers the heat at its tip. The smart holder is a weighted resting cradle for the handpiece; it automatically detects when the handpiece is in or out of the cradle and switches the controller between standby and active heating.

This manual covers normal operation using only the on-device controls. Host-computer integration over USB is described in a separate API reference document and is not required for normal use.

2. What's in the Box

The HTS System Kit (CX2399-01A) contains:

Qty	Part Number	Item
1	CX2400-01A	HTS Temperature Controller Gen 2
1	CX2401-01A	HTS Smart Holder Gen 2
2	CX2402-01A	HTS Handpiece Gen 2
1	CX2224-01A	24 V AC/DC Power Adapter
5	CX2213-08A	HNI Tip Adapter, Red (0.6 mm ID) — spares
5	CX2457-01A	Handpiece Retention O-Ring — spares

Inspect each item on receipt. If any item is missing or visibly damaged, contact Croxel before powering on the system.

3. At a Glance

Figure 1. HTS system in normal operating layout.

4. Panels and Connectors

The HTS controller has a front panel and a rear panel. The front panel hosts the operator interface (display, knob) and the handpiece port. The rear panel hosts power and host-computer connections.

4.1 Front Panel

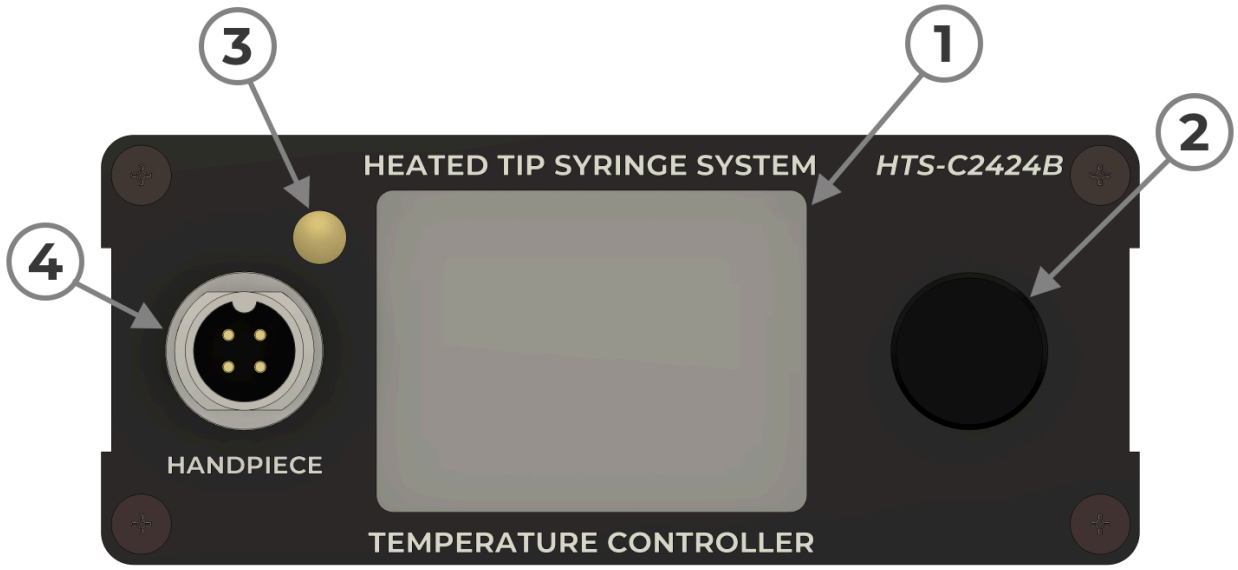

Figure 2. Front panel of the HTS controller.

#	Feature	Purpose
1	**Display**	2" LCD showing status, temperature, and prompts.
2	**Control knob**	Turns and presses; the sole on-device control. See §8.
3	**Status LED**	Multi-color indicator showing system state at a glance. See §11.
4	`HANDPIECE` **port**	Connect the handpiece cable here.

4.2 Rear Panel

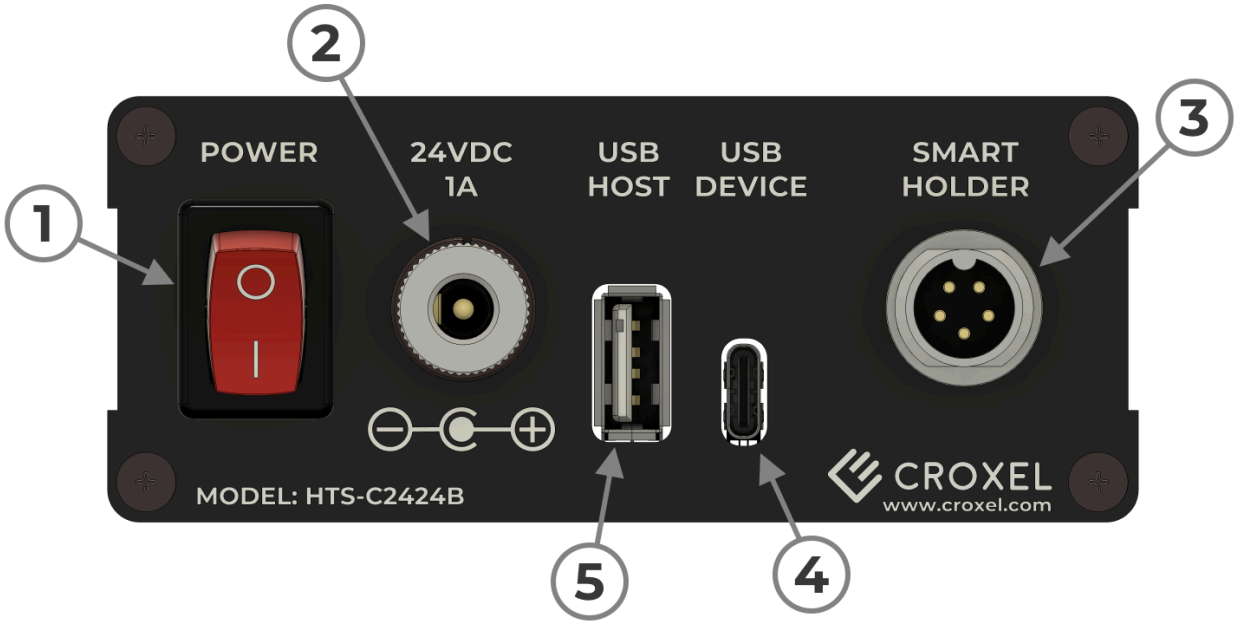

Figure 3. Rear panel of the HTS controller.

#	Label on panel	Purpose
1	`POWER`	On/off switch.
2	`24VDC 1A`	Power jack. Connect the 24 V AC/DC adapter (CX2224-01A) here.
3	`SMART HOLDER`	Connect the smart holder cable.
4	`USB DEVICE`	Connection to a host computer. Not required for normal operation.
5	`USB HOST`	Reserved for future use.

5. First-Time Setup

1. Place the controller on a stable, flat surface with both panels accessible.
2. Place the smart holder on the same surface, within reach of the controller.
3. Connect a handpiece cable to the `HANDPIECE` port on the **front** of the controller.
4. Connect the smart holder cable to the `SMART HOLDER` port on the **rear** of the controller.
5. Seat the handpiece in the smart holder.
6. Confirm the `POWER` switch on the rear of the controller is in the **off** position.
7. Plug the AC/DC adapter into the `24VDC 1A` jack on the **rear** of the controller, then plug the adapter into a wall outlet (100–240 V AC, 50/60 Hz).
8. Set the `POWER` switch to the **on** position. The splash screen appears for approximately three seconds, then the main screen is displayed. The system is now ready for use.

6. The Splash Screen

For roughly three seconds after power-on, the controller displays a splash screen containing the **Croxel logo**, the **firmware version** and **build date**, the **last calibration date**, and the **device serial number**. The splash screen automatically transitions to the main screen; no input is required.

Figure 4. HTS splash screen at power-on.

The information on the splash screen is for identification and traceability. If you need to record the firmware version or serial number for a service inquiry, you can read it from the splash screen at any time by power-cycling the unit.

7. The Main Screen

The main screen is the controller's normal operating display.

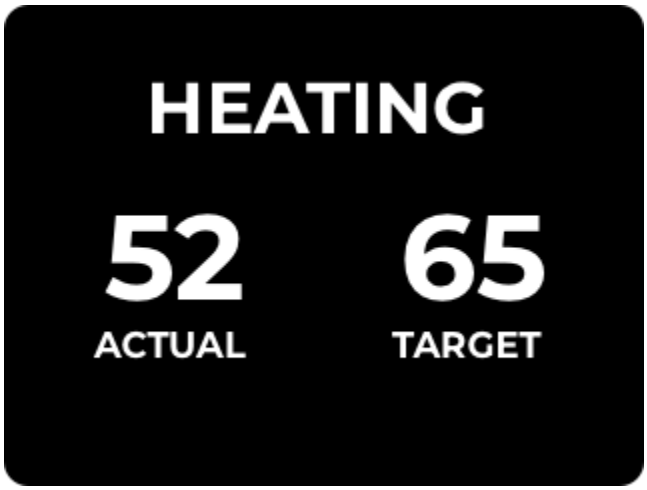

Figure 5. HTS main screen while heating.

Zone	Content	Meaning
Header	A short status word	The current state of the controller, see the table below.
Left	Large number + `ACTUAL`	The measured temperature at the handpiece tip, in degrees Celsius.
Right	Large number + `TARGET`	The currently configured setpoint, in degrees Celsius.

Header states:

Header	Meaning
`HEATING`	Heating is active. The controller is driving the handpiece toward the target temperature.
`SLEEP`	Heating is off. The handpiece will cool toward ambient.
`ADJUST`	The target setpoint is currently being edited (see §9.1). The TARGET value blinks while in this state.
`POWER-CYCLE UNIT`	A fault has occurred that requires the unit to be powered off and back on. See §12.

8. Using the Control Knob

All on-device interaction is via the single **control knob** on the front of the controller. The knob can be **turned** in either direction and **pressed** like a button. The press is interpreted differently depending on how long the knob is held down.

Gesture	Meaning
Turn clockwise	Increment the active value (or, on the main screen, enable heating).
Turn counter-clockwise	Decrement the active value (or, on the main screen, disable heating).
Quick press (release immediately)	Exit setpoint adjustment, if active.
Press and hold ~1–3 seconds	Enter or leave the setpoint adjustment mode.
Press and hold ~3 seconds or longer	Toggle between the main screen and the Expert screen (see §10).

9. Operating Tasks

9.1 Adjust the Temperature Setpoint

The setpoint is the temperature the controller will drive the handpiece tip to when heating is enabled.

1. From the main screen, **press and hold the knob for about one to two seconds**, then release.
2. The header changes to `ADJUST` and the TARGET value blinks.

Figure 6. Adjust mode; the underlined TARGET digits blink while the value is being edited.

3. **Turn the knob clockwise** to increase the setpoint, or **counter-clockwise** to decrease it. Each detent changes the setpoint by **1 °C**.
4. The valid range is **50 °C to 80 °C**. The controller will not accept values outside this range.
5. The new value is saved automatically as soon as you turn the knob.
6. To leave adjustment mode, **quick-press the knob**, or simply do nothing for **about five seconds**; the screen will return to the main view on its own.

Note: When you leave the adjustment screen, heating is **off** (header shows `SLEEP`). To begin heating at the new setpoint, follow §9.2.

9.2 Start and Stop Heating

From the main screen, with the header showing `SLEEP`:

- **Turn the knob clockwise** to enable heating. The header changes to `HEATING` and the controller begins driving the handpiece toward the target temperature.
- **Turn the knob counter-clockwise** to disable heating. The header returns to `SLEEP`.

The handpiece reaches the setpoint in **less than five seconds** under typical conditions.

9.3 Smart Holder Behavior (Automatic Standby)

The smart holder detects whether the handpiece is in its cradle and switches the controller accordingly.

- When the handpiece is **placed in** the holder, the controller automatically enters standby (header changes to `SLEEP`).
- When the handpiece is **lifted out** of the holder, the controller automatically re-enables heating to the current setpoint (header changes to `HEATING`).

No operator action is required. This behavior is always active and reduces the risk of leaving a heated handpiece unattended on the workbench.

9.4 Inactivity Timeout

To provide an additional safeguard, the controller automatically returns to standby after a configurable period of operator inactivity. The factory default is **three minutes**.

If heating has been enabled but no operator activity is detected within the timeout window, the header changes from `HEATING` to `SLEEP` on its own. To resume heating, turn the knob clockwise.

10. The Expert Screen

The Expert screen is a diagnostic view intended for service technicians. It shows detailed sensor and controller readings. Nothing on this screen can be changed from the knob; it is read-only.

To enter or leave the Expert screen: press and hold the knob for **about three seconds**, then release. The screen toggles between the main view and the Expert view.

The Expert screen displays:

- **Header** — the same status word as the main screen (`HEATING`, `SLEEP`, `ADJUST`).
- **Process value (PV)** — measured handpiece temperature in °C, shown with two decimal places.
- **Setpoint (SV)** — configured target temperature in °C.
- **Controller internals (P, I, O)** — instantaneous control values used by the temperature regulator. Provided for diagnostics only.
- **Supply readings (V, I, P)** — voltage, current, and power drawn from the AC/DC adapter.
- **Handpiece status (HNDP)** — `ON-HOOK`, `OFF-HOOK`, or `UNKNOWN`, plus the raw detection voltage.

If a service representative asks for these values, return to the Expert screen and read them off the display. Otherwise, return to the main view.

11. Status LED

A single multi-color LED on the controller indicates system status at a glance:

LED state	Meaning
Solid green	Idle. Heating is off.
Solid red	Heating is on.
Blinking red	A fault has been detected. See §12.

12. Errors and Troubleshooting

When the controller detects a fault, the normal display is replaced by an error screen with the header **`HTS SYSTEM`** at the top and the word **`ERROR:`** followed by a short title. A recommended action is shown below.

Figure 7. An example error screen (`BAD TEMPERATURE` shown).

Error title on screen	Likely cause	What to do
`OVER-TEMPERATURE`	Internal safety limit was exceeded.	Disconnect the power adapter, wait at least 30 seconds, then reconnect. If the error returns, stop using the system and contact Croxel.
`INVALID POWER SUPPLY`	The detected supply voltage is outside the acceptable range.	Confirm that the supplied Croxel AC/DC adapter (CX2224-01A) is connected and that the wall outlet is live. Replace the adapter if damaged.
`OVER-POWERING`	The controller drew more power than the safety threshold allows.	Power-cycle the unit. Confirm the correct handpiece is connected. If the error returns, contact Croxel.
`TEMP REGULATION`	The handpiece failed to reach the setpoint within the allowed time.	Power-cycle the unit. Check that the handpiece cable is fully seated and that the handpiece is intact. If the error returns, contact Croxel.

Error title on screen	Likely cause	What to do
`OUTPUT DRIVER`	A fault was detected in the controller's heating output.	Power-cycle the unit. If the error returns, stop using the system and contact Croxel.
`BAD TEMPERATURE`	The controller cannot read a valid temperature from the handpiece. The body text reads `PLEASE CONNECT A WORKING HANDPIECE.`	Confirm that a handpiece is connected and that its cable is fully seated. If the error persists, swap in the second handpiece from the kit.

After resolving the underlying cause, the error screen clears automatically and the main screen reappears. Most errors require a full power cycle (unplug, wait, replug) before the controller will recover.

If an error persists after troubleshooting, record the **error title from the screen** and the **firmware version and serial number from the splash screen** (§6), and contact Croxel support.

13. Specifications

Specification	Value
Temperature range	50 °C to 80 °C
Heat-up time	Less than 5 seconds to setpoint
Control accuracy	± 2.5 °C
Setpoint resolution	1 °C
Display	2" LCD
User interface	Rotary knob with push button
Status indicator	Single multi-color LED
Input power	100–240 V AC, 50/60 Hz (via included adapter)
Adapter output	24 V DC, 1 A
Controller dimensions	3.7 × 4.9 × 1.8 in (95 × 125 × 45 mm)
Compatible accessories	CX2213 series HNI tip adapters

14. Care, Storage, and Support

Cleaning. Wipe exterior surfaces of the controller, holder, and handpiece with a dry or lightly damp cloth. Do not immerse any part of the system in liquid. Do not use solvents or abrasive cleaners. Allow any wiped surface to dry fully before powering the system on.

Storage. When not in use, leave the handpiece seated in the smart holder so the controller remains in standby. Store the system indoors in a dry environment away from direct sunlight.

Service and warranty. This product contains no operator-serviceable parts. For service, warranty claims, replacement components, or technical questions, contact Croxel.

Contact: contact@croxel.com

End of manual.

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