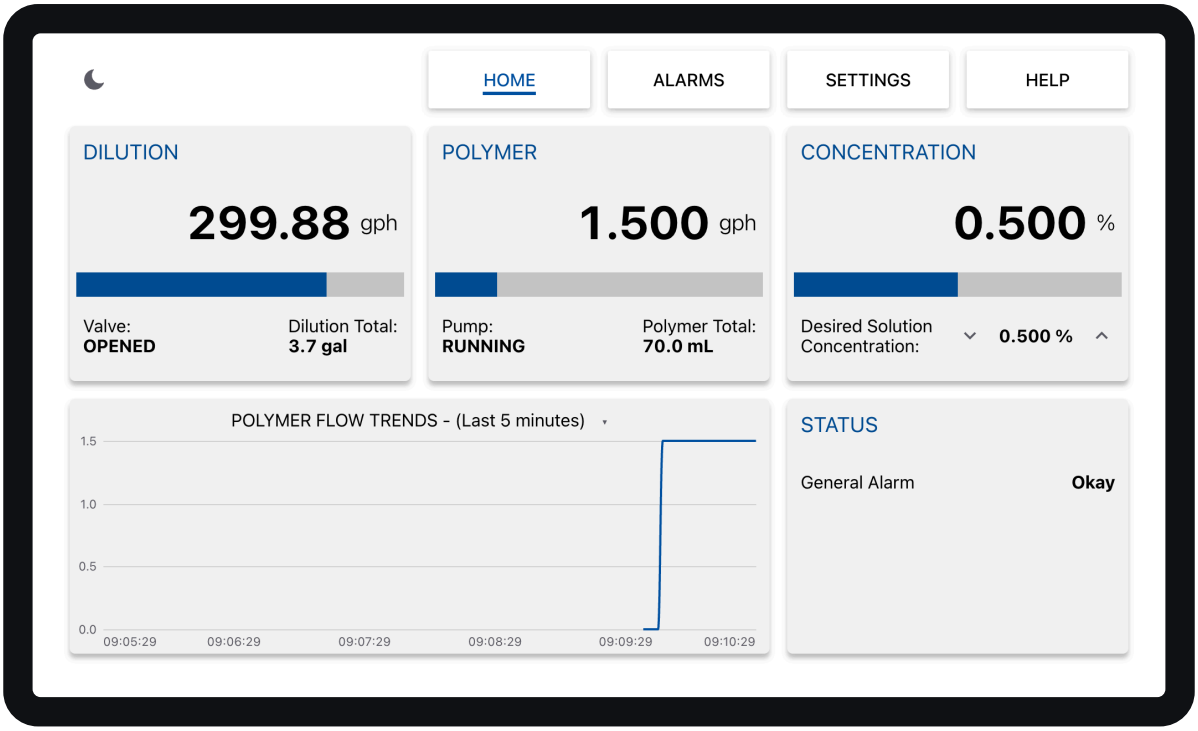
EXCELL FEEDERS

Cortex 7 Controller

HMI Manual

Touchscreen operation and service



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1 About this manual

This manual explains how to operate and look after a Cortex 7 controller from its touchscreen (the HMI), whatever machine it runs.

A Cortex 7 runs one **application**: the program for the machine it controls, such as a 6PSevo or a 6PCevo polymer feeder. This manual covers what every Cortex 7 has: the touchscreen, the alarms, the inputs and outputs, setting up a new controller and the service functions. What a machine shows on its HOME screen, its settings and its alarms are in that machine's **Operation and Maintenance (O&M) manual**. The figures here show a 6PSevo.

Operators mainly need chapters 3 to 8. Chapter 9 covers the service functions, which are protected by a PIN. Setup and troubleshooting from a computer, in the Cortex Console, are in the separate Cortex 7 Console Manual.

Conventions

- Names on the screen are shown like **SETTINGS** or **Acknowledge All**.
- A path such as **HELP → Service** means: tap HELP, then tap Service.
- "Tap" means touch the screen once; on a computer, click.

> **!** **CAUTION**
>
> Changes made on the touchscreen or in a browser go straight to the controller and can start, stop or change the speed of the machine's pumps and motors. Make sure it is safe before changing modes, setpoints or configuration, and follow your site's lock-out procedures before any work on the equipment.

Getting help

Excell Feeders support: support@excellfeeders.com, 732.828.8655. When you call, have the panel's host name and versions ready (HELP → VERSIONS and RESOURCES). Section 9.11 explains how to save a service snapshot.

2 System overview

The Cortex 7 system has two parts that work together:

- **The controller** runs the machine: it reads the inputs (flowmeters, transmitters, switches), drives the outputs (pumps, valves, motors, relays) as its application says, and raises the application's alarms. It keeps working on its own if the touchscreen is restarted or disconnected.
- **The HMI panel** (the 1024 × 600 touchscreen) shows what the controller is doing, lets you change modes and setpoints, keeps the alarm history and trends, and connects the machine to the plant network.

Applications and models

The application decides what the controller does and what the screens show. A panel keeps its own machine's application and offers it when a controller has none (chapter 4). Some machines come in several **models** that share one application, for example the 6PSevo400 and the 6PSevo1200: the models differ only in their factory settings, and a controller can be changed from one model to another (section 9.3).

The Cortex OS (the panel's software), the controller firmware and the applications are released separately, each with its own version. Versions are dates: 2026.11.12, then 2026.11.12+1 for a later release the same day; a later date is newer.

A computer on the plant network can also show these screens in a browser, and the Cortex Console adds trends, logs and remote support. Those are covered in the Cortex 7 Console Manual.

3 Using the touchscreen

The panel starts on its own when power is applied; the HOME screen appears after about a minute. There is no login for normal operation.

Screen layout

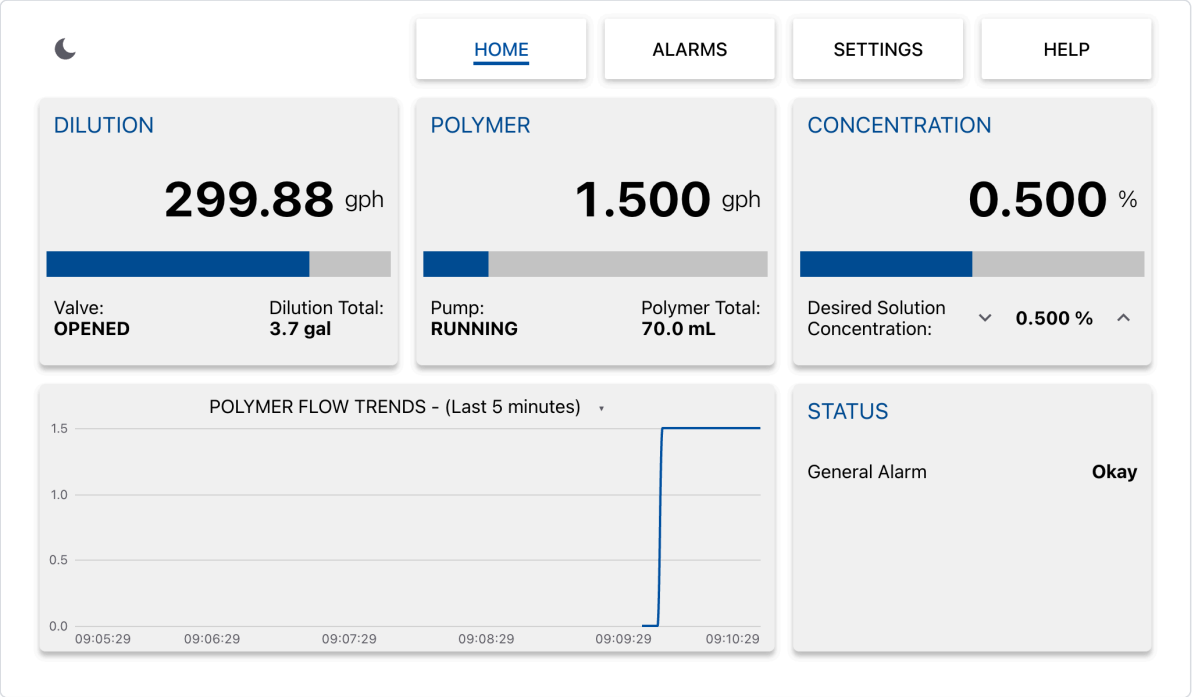

Figure 1 · The HOME screen of a 6PSevo

Four buttons along the top switch between the screens. The current screen is underlined.

Button	Shows
HOME	The machine at a glance: its flows and states, a 5-minute trend and a status summary, as its application lays them out.
ALARMS	Active alarms and the alarm, event and change history. A red number shows how many alarms are active.
SETTINGS	The application's modes, setpoints and configuration, and the controller's inputs and outputs.
HELP	Inputs and outputs, controller and panel status, versions and the display theme, then the application's own help cards.

The moon/sun icon at the top left switches between light and dark mode. When a service login is active, a green **Changes unlocked** badge appears next to it.

Entering values

Setpoints with a pencil icon open the touch keypad. Type the new value and tap **Enter**. The keypad shows the allowed range and refuses values outside it. **Clear** empties the entry, **Cancel** leaves the value unchanged.

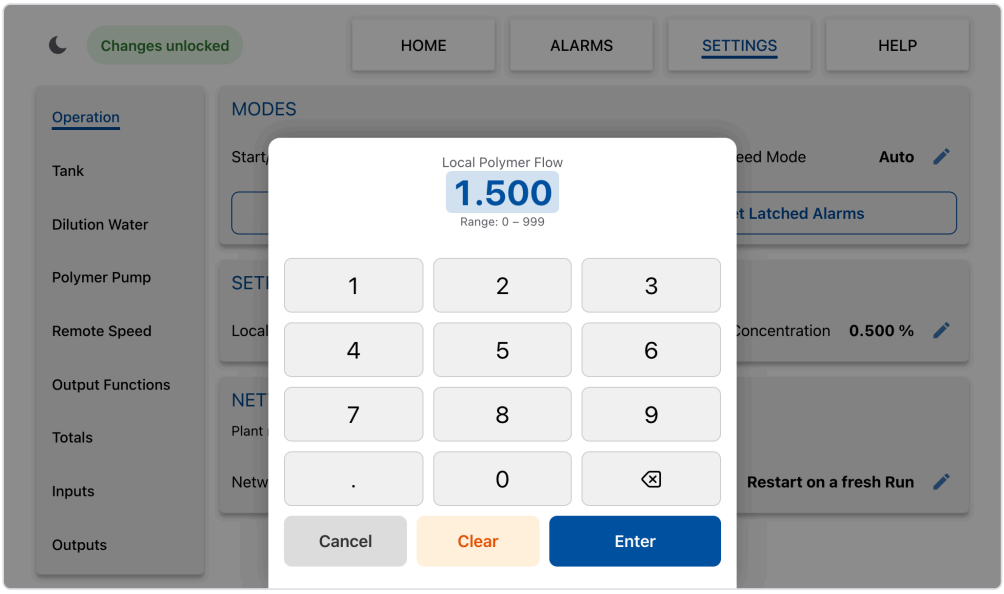

Figure 2 · The touch keypad

Drop-down settings (modes, functions, choices) open a list; tap the option you want. The active choice has a check mark. A mode takes effect as soon as it is chosen.

> **NOTE**
>
> A changed value is shown as pending until the controller confirms it. If the controller does not confirm the change within a few seconds, a message says so and the old value stays in place. Every change is recorded under ALARMS → Changes with the old and new value.

4 Setting up a new controller

A new controller has no application, so every output is off. The touchscreen then shows **SET UP THIS CORTEX 7** in place of HOME, with one tile for each machine and model this panel carries, and the front panel's lights chase round.

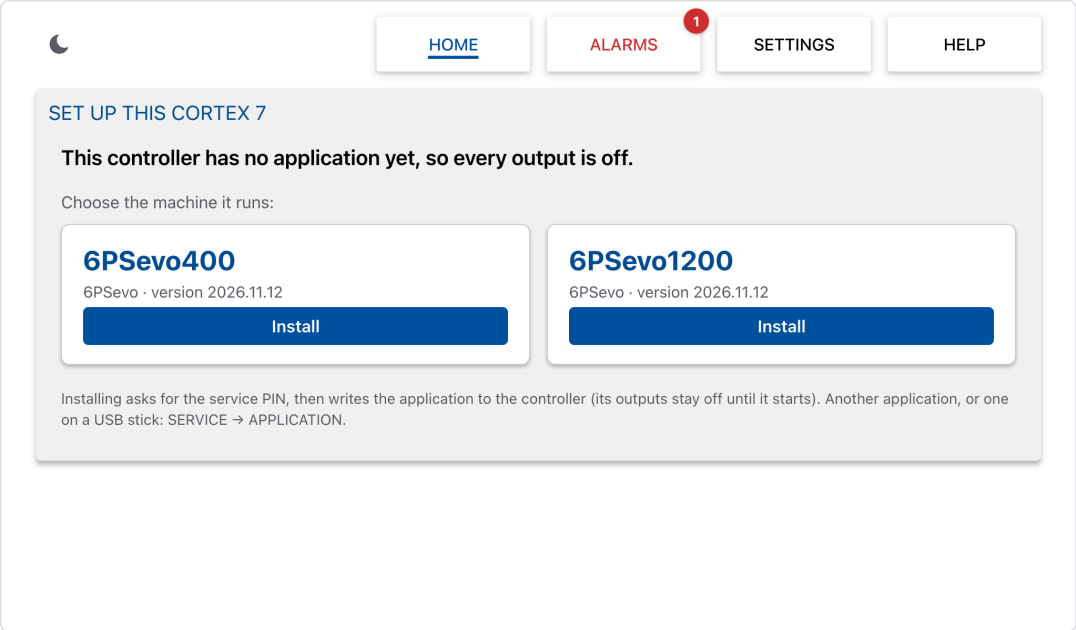

Figure 3 · Setting up a new controller

1. Tap **Install** on the tile of the machine and model this controller runs (for example the **6PSevo1200**).
2. Enter the service PIN (section 9.1).
3. Confirm the install. The controller stops for about half a minute, then starts the application on its factory settings, and HOME appears.
4. Check the settings and the inputs and outputs against the machine's O&M manual before running it.

If the controller has an application it cannot run (damaged, or needing newer controller firmware), the screen says **NO APPLICATION RUNNING** with the reason, and offers the same tiles to install it again. A panel that carries no application says so: install one from a USB stick (section 9.2).

> **NOTE**
>
> A panel gets its machine's application when it is built (**flash-emmc --product**), or keeps the one its controller runs. A newer version installed from USB replaces the copy it keeps.

5 HOME, SETTINGS and HELP

What these screens show comes from the application: its O&M manual describes each card, section and setting. They all work the same way.

HOME

Each card shows one part of the machine: a large value with a bar against its full scale, and rows under it (states, totals). A card or a row appears only when it applies: a row for an option shows only when that option is set up. Some rows have ‹ › buttons to change a setpoint in small steps. The trend card shows the last 5 minutes; tap its title to add a second value on its own scale.

SETTINGS

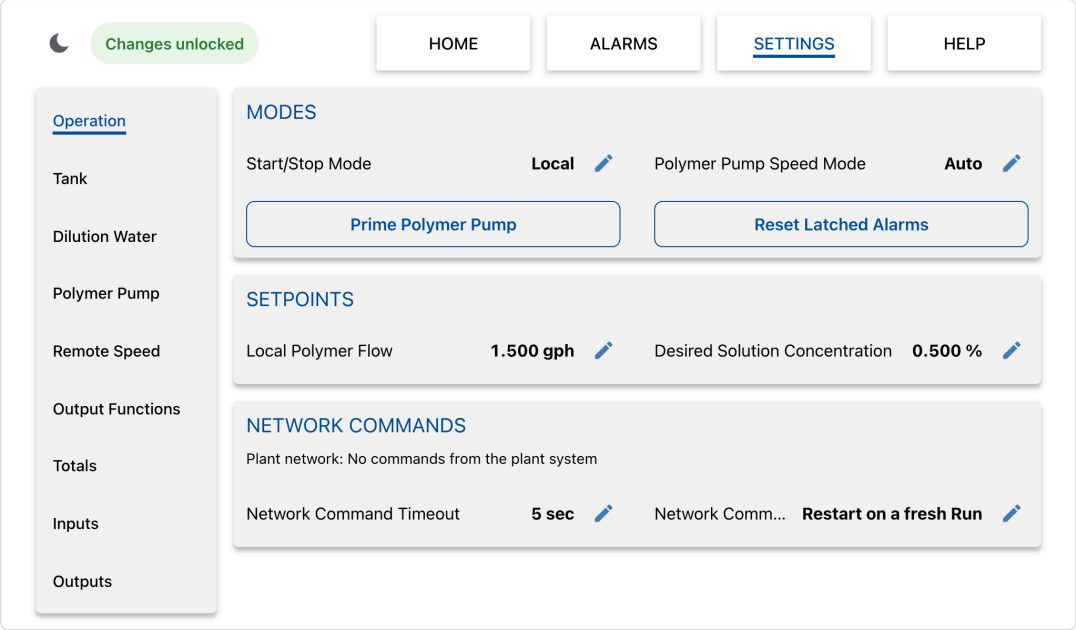

Figure 4 · SETTINGS, a section of a 6PSevo

The SETTINGS screen has a list of sections on the left. Tap a section to show its settings; the current one is underlined. A section, card or row that does not apply is not shown: for example a custom minimum and maximum only when a scaling is set to Custom, or a section only once its input is set up (chapter 6).

> **!** **CAUTION**
>
> The settings change how the machine runs. Only trained staff should change the configuration; record the settings with a backup first (section 9.4).

HELP

The HELP screen starts with the controller's own cards (chapter 8); the application's help cards follow.

6 Inputs and outputs

The last sections of SETTINGS, **Inputs** and **Outputs**, put the application's functions on the controller's terminals. The application decides which functions there are and where each starts from the factory; its O&M manual lists them.

Digital inputs

Each digital input (DI1, DI2 and DIO3–DIO6) is given a function and a contact type. **Contact** is Normally Open (on when the contact closes) or Normally Closed (on when it opens, for fail-safe wiring). A function can be on several inputs; what that means is in the O&M manual.

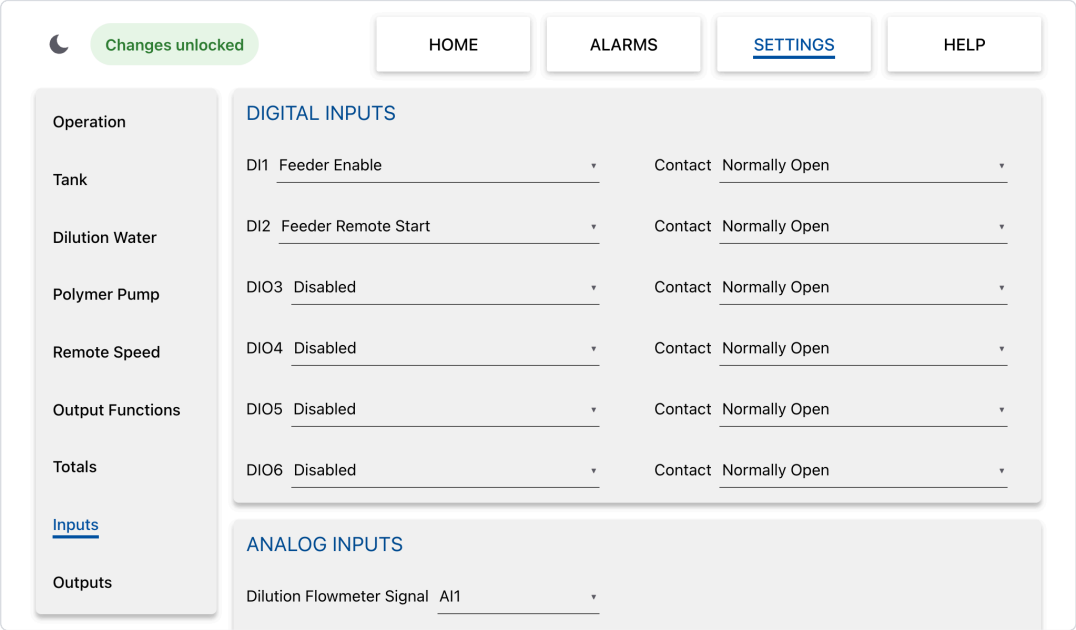

Figure 5 · SETTINGS, Inputs section

> **NOTE**
>
> DIO3–DIO6 are shared terminals: each one is either a digital input or a transistor output. To use it as an input, set its output to Disabled first, and the other way round.

Analog inputs

Each analog input (AI1–AI4) is given one function, and the **Signal** beside it shows its reading in mA. Choosing a function that is on another input moves it here, and that input becomes Disabled. Setting a function on an input often brings its section and modes on SETTINGS.

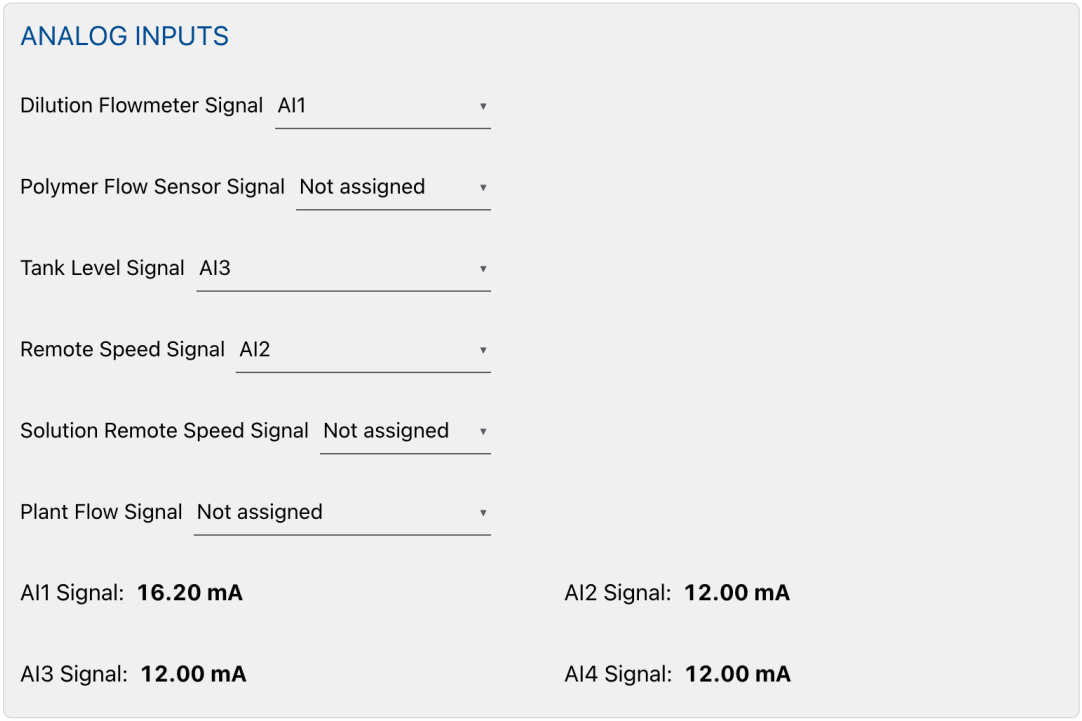

Figure 6 · The ANALOG INPUTS card, below the digital inputs

Outputs

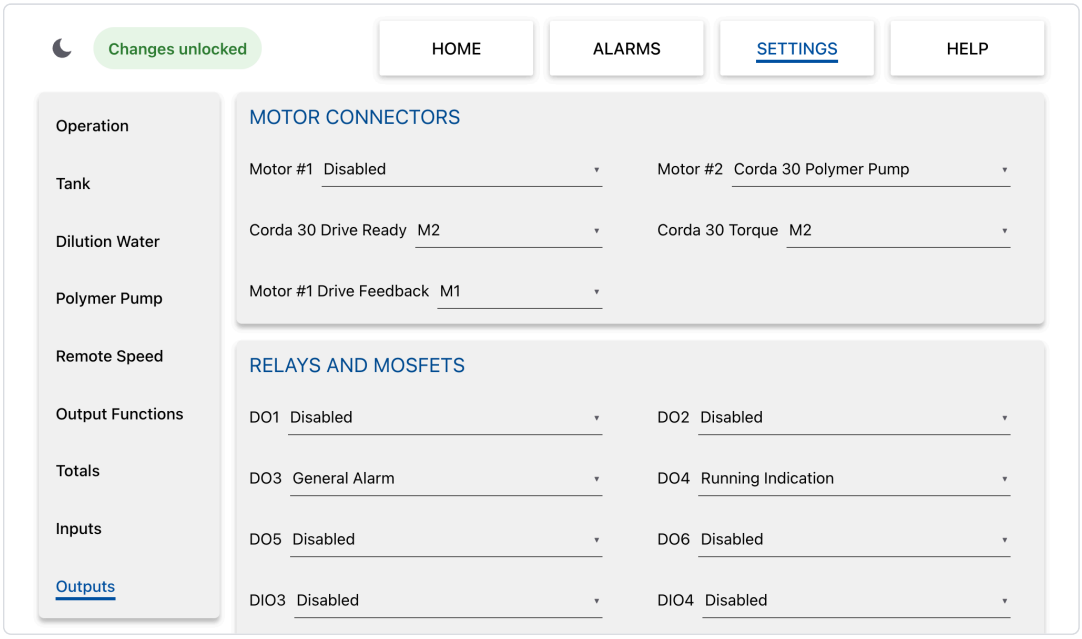

Figure 7 · SETTINGS, Outputs section

- **Motor Connectors** — what each motor connector drives (Motor #1 and Motor #2), with Motor #1's direction and feedback where the application has them.
- **Relays and MOSFETs** — each relay output (DO1–DO6) and transistor output (DIO3–DIO6) can be given a function or Disabled.

- **Analog Outputs** — AO1 and AO2 each have a function (a speed, a valve, a retransmitted value) or Disabled, with the **Signal** in mA.

A function is offered only when what it needs is set up; one already set stays in the list. An output on no function is off.

7 Alarms

When an alarm occurs

A new alarm opens a pop-up on the touchscreen with the alarm's name, and the **ALARMS** button turns red with the number of active alarms.

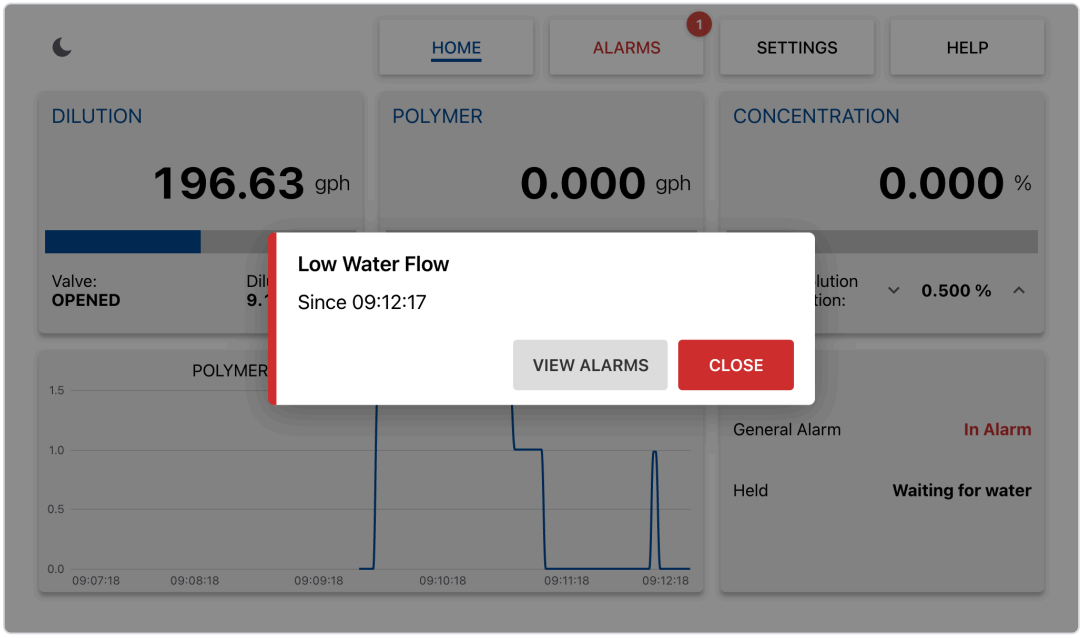

Figure 8 · Alarm pop-up

1. Tap **View Alarms** to see the details, or **Close** to dismiss the pop-up.
2. Find and correct the cause: the application's alarms are listed in its O&M manual, the controller's own below.
3. On the ALARMS screen, tap **Acknowledge All** to acknowledge the active alarms. An alarm clears by itself when its condition goes away; acknowledging records that someone has seen it.

Latching alarms

An alarm set to latch stays active after its cause has gone, and keeps what it stops stopped, until it is reset. The ALARMS screen shows it as **Latched**. Acknowledging also resets: **Acknowledge All** (or **Reset Latched** once everything is acknowledged), an Alarm Acknowledge input, or the acknowledge bit from a PLC. Closing the alarm pop-up only acknowledges; it does not reset a latch. A latch only resets once its cause has gone; correct the cause first. The controller holds the latches itself, so they work even while the touchscreen is restarting. Which alarms can latch, and what each stops, is in the O&M manual.

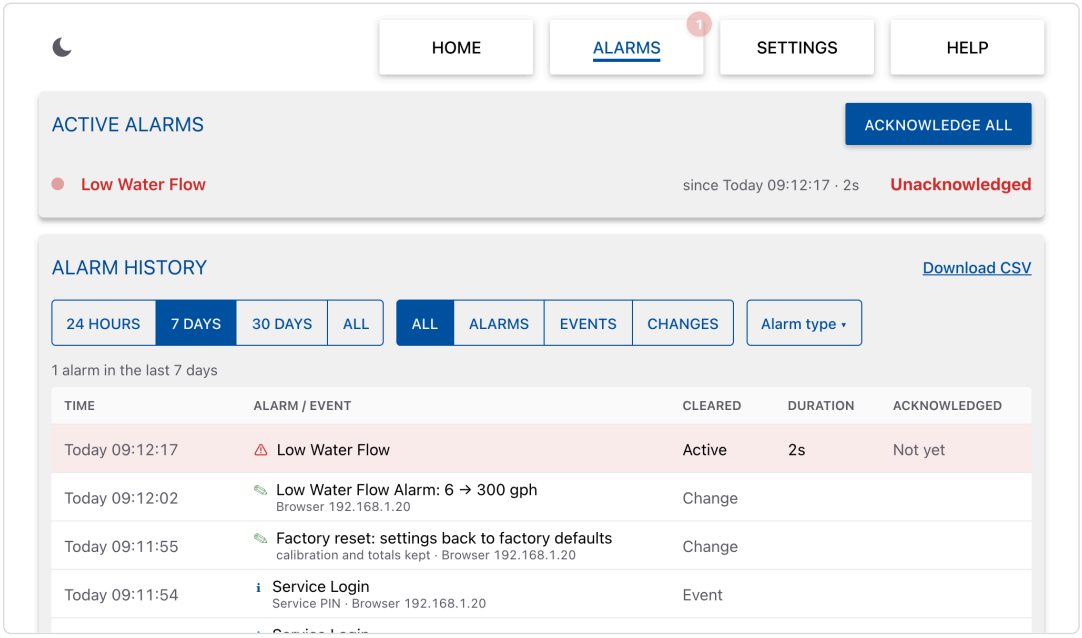

Figure 9 · ALARMS screen with an active alarm

The controller's own alarms

Every Cortex 7 has these, whatever its application:

Alarm	Meaning	What to do
Controller Communication Lost	The panel has lost contact with the controller, and a Controller offline banner shows. The controller keeps running the machine on its own.	Controller power. Contact support if it persists.
Controller Not Accepting Commands	The controller is online but does not answer the panel's regular command check, so setting and mode changes would not be applied. It clears by itself when commands get through again.	Restart the controller. Contact support if it comes back.
No Application Installed - Outputs Off	The controller has no application yet; every output is off.	Install one (chapter 4).
Application Not Running - Outputs Off (SERVICE)	The controller has an application it cannot run; the details say why (not signed by Excell, damaged, or needing newer controller firmware). Every output is off.	Install the application again (chapter 4), or update the controller firmware (section 9.2).
Newer Application Refused (SERVICE)	An application was installed but the controller could not run it, and carries on with the one before. The details say why.	As above; ALARMS → Changes has the install.

Alarm	Meaning	What to do
Controller Firmware Not Running - Install It From USB (SERVICE)	The controller is waiting in its update mode with no firmware that starts, for example after an update that was cut off. Its outputs are off.	Install controller firmware from a USB stick (section 9.2).
Controller Firmware Too Old - Update It (SERVICE)	The controller runs a firmware from before applications. Nothing of it is served.	Install the controller firmware from a USB stick (section 9.2).
Controller Settings Checksum Error	At its last start the controller found both saved copies of its settings damaged, or could not read them; every setting is at its default. (A power cut while saving does not cause this: the controller keeps two copies.)	Turn the controller off and on again. If the alarm comes back, check the settings or restore a settings backup (SERVICE), then reset the alarm on the ALARMS screen.
Controller Hardware Fault (SERVICE)	A part of the controller board is not answering: the settings memory, an analog output or the front panel lights. The details name which. Everything else keeps running.	Check what the named analog output drives. Contact support: the controller board needs service.

Alarm history

The ALARM HISTORY lists alarms (with when they cleared, how long they lasted and when they were acknowledged), events (panel and controller restarts, service logins, software updates) and changes (every setting change, with who made it). Use the buttons to choose the time range and type, and **Alarm type** to show one kind of alarm. From a web browser, **Download CSV** saves the list for a spreadsheet. The panel keeps one year of history. Service staff can clear it (section 9.10).

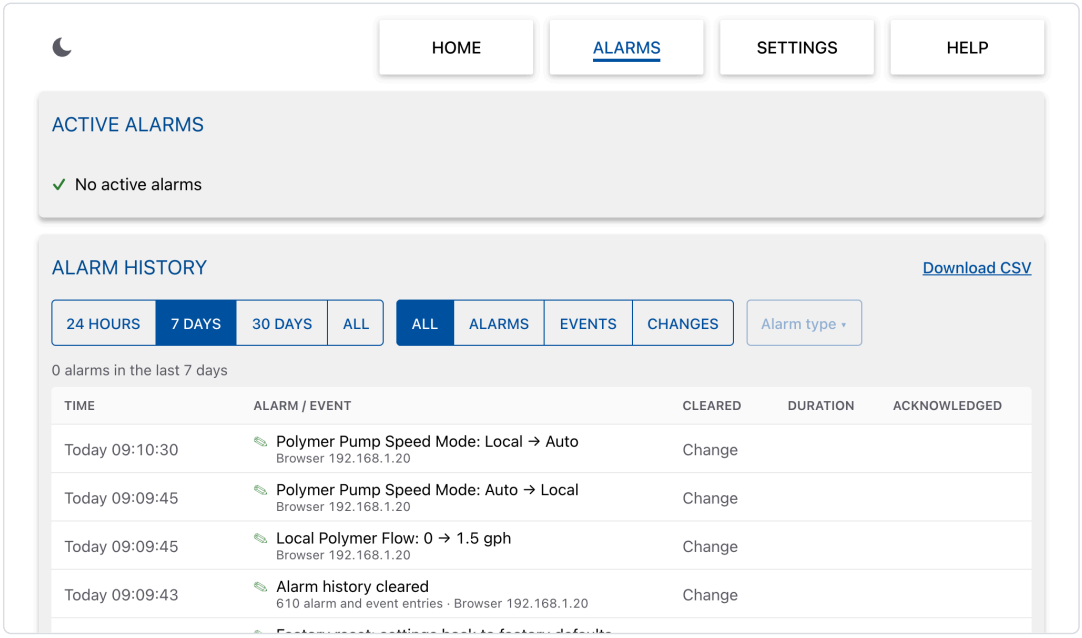

Figure 10 · Alarm history with filters

8 HELP screen

The **Service** and **Cortex Console** buttons at the bottom of the HELP screen lead to the service functions (chapter 9) and the browser console (see the Cortex 7 Console Manual).

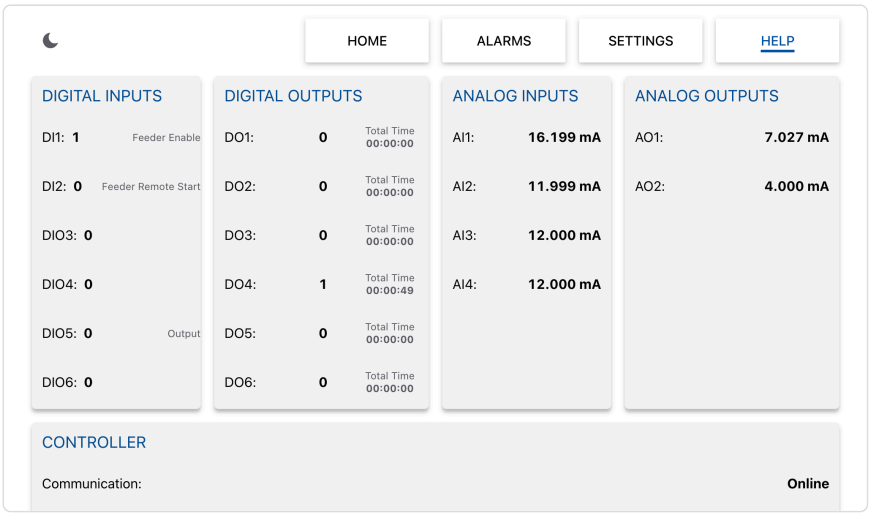

Figure 11 · HELP screen (top)

Card	Shows
DIGITAL INPUTS / **DIGITAL OUTPUTS**	Each digital input and output (0 = off, 1 = on), and how long each output has been on in total.
ANALOG INPUTS / **ANALOG OUTPUTS**	Each analog input and output in mA.
CONTROLLER	Communication state, whether the controller accepts commands, the cause of the last controller restart and any stored fault.
RESOURCES	Panel load, memory, panel and controller uptime, the panel's date and time, host name and IP address.
VERSIONS	Model number, the Cortex OS, HMI software, application and controller firmware versions.
DISPLAY	Theme: Light, Dark or Auto.

The application's cards follow, for example its pump drive's diagnostics or its maintenance counters: see its O&M manual.

9 Service functions

The SERVICE screen holds the functions that change how the panel and the controller are set up. It is protected by a PIN. The sections below follow the order of its cards.

9.1 Signing in

1. Tap **HELP**, then **Service** (bottom right).
2. Enter the service PIN on the keypad and tap **Enter**.

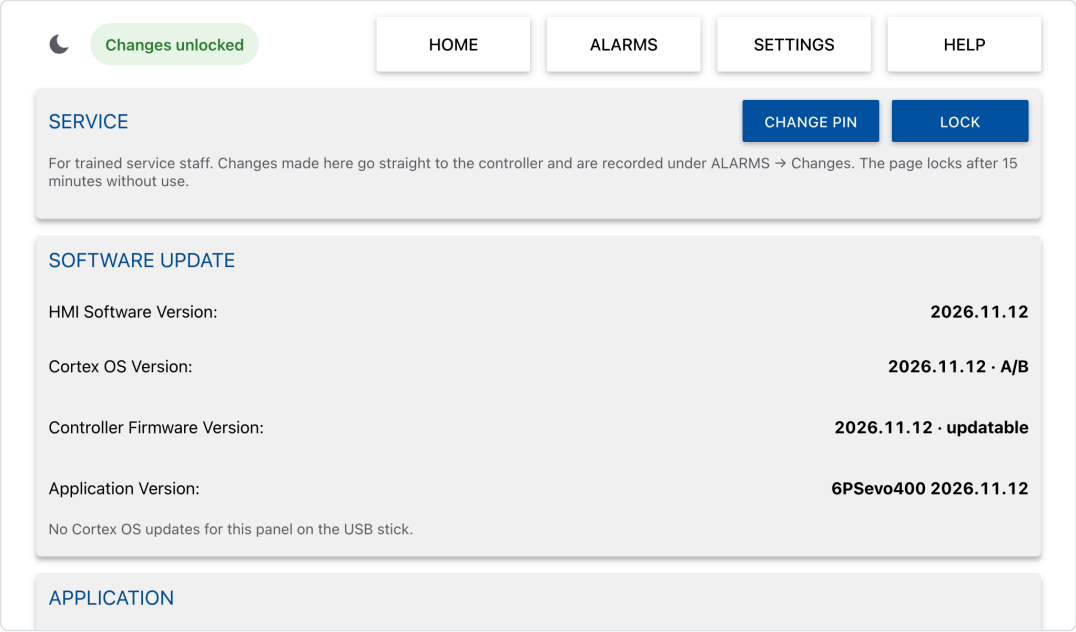

Figure 12 · SERVICE screen

- The service PIN is **1234** when the panel is delivered. Change it at commissioning with **Change PIN** (4 to 8 digits, entered twice).
- The login ends after 15 minutes without use, or when you tap **Lock**.
- After five wrong PINs, PIN entry is blocked for a minute.
- If the PIN has been lost, contact Excell Feeders support.

> **NOTE**
> Every service login and every change is recorded under ALARMS → Changes.

9.2 Software updates

The **SOFTWARE UPDATE** card shows the installed versions (HMI software, Cortex OS, controller firmware and application) and lists the updates found on a USB stick, in its top folder or a **cortex** folder.

> **NOTE**
> The panel installs only software signed by Excell Feeders. A file that is not signed, or has been changed, is refused with a message and nothing is installed.

Updating the panel (Cortex OS)

1. Copy the **cortex-os_<version>_cm4.update** file to a USB stick.
2. Insert the stick in the panel and open SERVICE → **SOFTWARE UPDATE**.
3. Tap **Install** next to the update and confirm.
4. The panel writes the update (a few minutes), then restarts into it. After the restart it checks that everything runs; if not, it returns to the previous version by itself. The result appears in ALARMS → Changes.

> **NOTE**
> The controller and the machine keep running while the panel updates. Settings, PIN, accounts, alarm history, trends and the panel's applications are kept.

Updating the controller firmware

1. Copy the **cortex-mcu_<version>_1101_pcb_15.fw** file to the USB stick.
2. In **SOFTWARE UPDATE**, tap **Install** next to the controller firmware and confirm.
3. The update takes about a minute. If the new firmware does not start correctly, the panel puts the previous firmware back.

> **CAUTION**
> The machine stops while the controller firmware is updated: all outputs are off for about a minute. Update when the machine can be stopped.

Updating the application

1. Copy the application's **<id>-<version>.cortexapp** file (for example **excell-6psevo-2026.11.12+2.cortexapp**) to the USB stick as it downloads. One file holds every model of the machine. (Packages from before were named **.app**; the panel still takes those.)
2. In **SOFTWARE UPDATE**, the application is listed with **Update** (newer), **Reinstall** (the same version) or **Downgrade** (older). Tap it and confirm.
3. The controller stops for about half a minute, then runs the new version as the same model, on the settings it had. The panel keeps the new version as its own.

A file for another machine is offered with **Install**: that replaces the machine this controller runs (section 9.3).

> **CAUTION**
> The machine stops while the application is installed: all outputs are off for about half a minute.

If the controller firmware is not running

If a firmware update was cut off, the controller waits in its update mode with its outputs off, and the panel raises **Controller Firmware Not Running - Install It From USB (SERVICE)**. **SOFTWARE UPDATE** then shows the firmware as not running. Insert a USB stick with the **.fw** file, tap **Install** and confirm: the machine comes back on its own settings.

9.3 Application

The **APPLICATION** card shows what the controller runs.

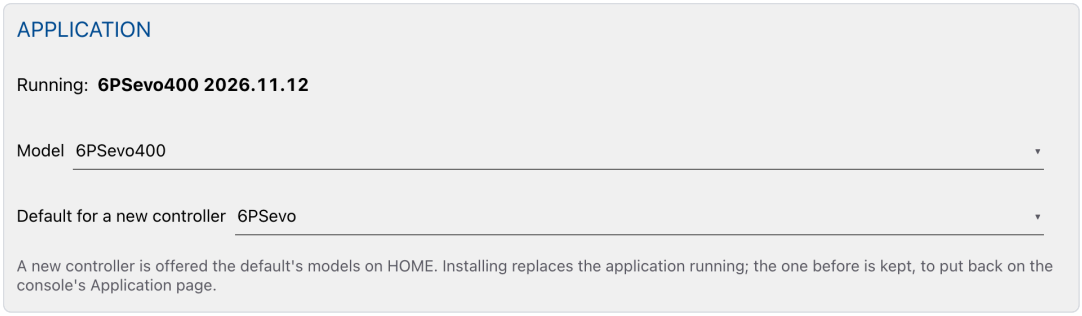

Figure 13 · The APPLICATION card

- **Running** — the application and model, and its version.
- **Model** — for a machine with several models. Tap it to change this controller to another model, for example when the machine is rebuilt. Settings are kept, but those still at the old model's factory values take the new model's (the flowmeter scaling, for example); each is recorded under ALARMS → Changes. The controller stops for about half a minute.
- **Default for a new controller** — the machine offered first on a new controller (chapter 4). With one machine on the panel, it is that one.
- **Install Another Application...** — shown only when the panel carries another machine's application. It replaces what the controller runs; the settings of the one before are not carried over, so save a settings backup first (section 9.4).

9.4 Settings backup

SETTINGS BACKUP saves the application's settings, with the terminals each function is on and the inputs' contact types, so they can be restored later or loaded onto a replacement controller: on the panel (the last 30 are kept), or on a USB stick (cortex-backups folder). Restoring shows what will change, writes only the settings that differ and checks each one with the controller. The analog input calibration is restored only onto the same controller board. Signed in with the factory PIN, a backup on the panel can be deleted (**Delete...**); the deletion is recorded under ALARMS → Changes.

9.5 Date & time

Shows the panel's date, time, time zone and whether network time is synchronized. Set the date and time by hand and choose the time zone. Alarm and change times use this clock.

9.6 Analog input calibration

Each analog input can be calibrated against a 4–20 mA calibrator when its reading is off. The calibration is stored in the controller.

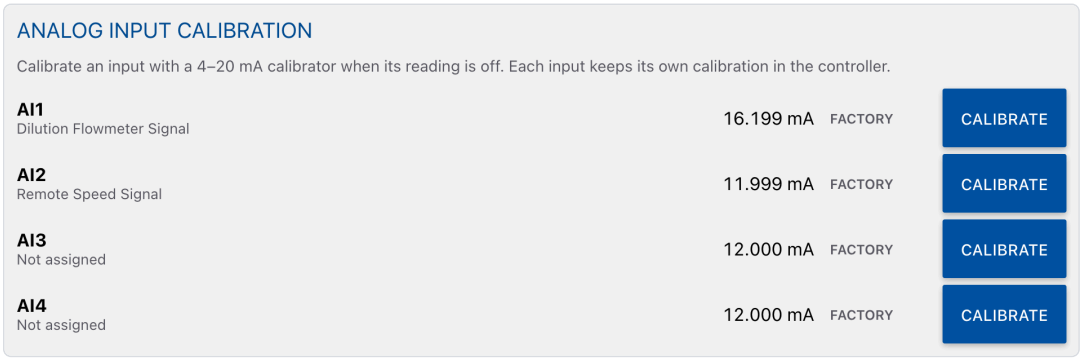

Figure 14 · Analog input calibration

1. Stop the machine, or put what the input controls in a local mode: while you calibrate, the controller reads the calibrator, not the field signal.
2. Disconnect the field device from the input and connect the calibrator in its place.
3. Tap **Calibrate** next to the input, then **Start**.
4. Set the calibrator to 4.000 mA and capture it (**Capture 4 mA**). The panel reads the input for 3 seconds.
5. Set the calibrator to 20.000 mA and capture it (**Capture 20 mA**).
6. Check the values and the reading with the new calibration, then **Save**.
7. Disconnect the calibrator and reconnect the field device.

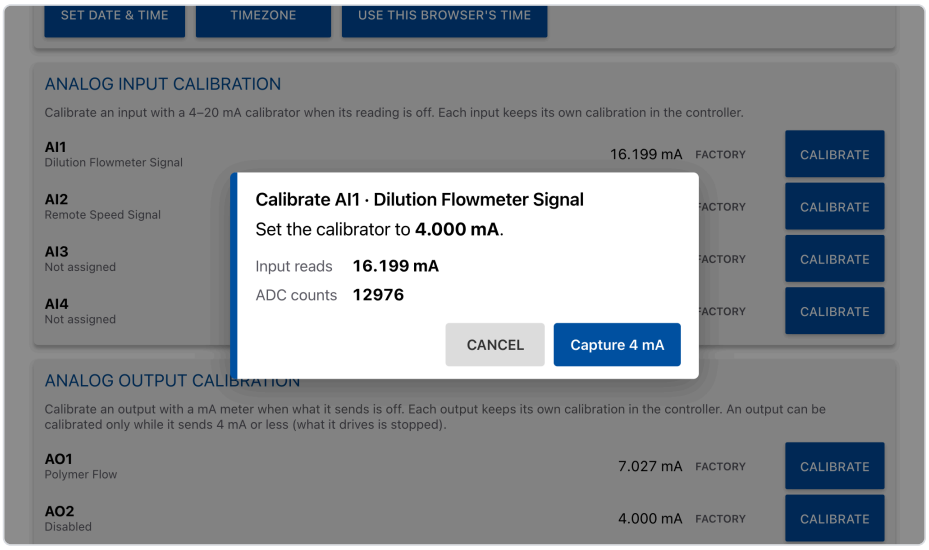

Figure 15 · Capturing the 4 mA point

If a reading is unsteady or far from what 4 mA or 20 mA should read, the panel says so and asks you to check the calibrator and wiring. **Factory** returns an input to its factory calibration.

9.7 Analog output calibration

Each analog output can be calibrated against a mA meter when what it sends is off. The calibration is stored in the controller. It needs the controller's platform firmware (an application installed, or none).

The output changes while you calibrate: whatever it is wired to sees about 4 mA, then about 20 mA, its full scale. An output can be calibrated only while it sends 4 mA or less, so stop what it drives first (or take its channel off the output on the I/O page). If its function needs the output during the calibration, the controller hands it back at once and the panel says so; it also hands it back after 15 minutes.

1. Stop what the output drives.
2. Put a mA meter in series with the output, or disconnect the field device and connect the meter in its place.
3. Tap **Calibrate** next to the output, then **Start**. The output is driven at about 4 mA.
4. Read the meter once it is steady and enter its reading (**Enter reading**). The output is driven at about 20 mA.
5. Enter the meter's reading again, check both, then **Save**. The output is driven at 20 mA with the new calibration: the meter should read 20.000 mA. **Check 4 mA** drives 4 mA.
6. **Close** hands the output back to its function. Disconnect the meter and put the wiring back.

A reading far from 4 mA or 20 mA, or one that would need a calibration far from the factory's, is refused with a message. Every drive and the calibration are recorded under ALARMS → Changes. **Factory** returns an output to its factory calibration.

9.8 Network

NETWORK shows the panel's plant network address, gateway and DNS servers. **Change...** switches between DHCP and a fixed (static) address. When the address changes, browsers connected to the panel must reconnect at the new address.

9.9 Modbus TCP and EtherNet/IP

These connect the machine to a plant system. Both are paid options (section 9.12) and off when the panel is delivered. Each can be switched on in **Read only** mode (the plant system can read values) or **Allow writes** mode (it can also change setpoints and modes, checked the same way as on the touchscreen and recorded under ALARMS → Changes).

Only one plant-network protocol can allow writes at a time, so two plant systems cannot fight over the same setpoints. Choosing **Allow writes** on one makes the others **Read only**, and the change is recorded under ALARMS → Changes. All can still be on for reading.

Register Map and **I/O Layout** list what the plant system sees: the controller's own values first, then the application's. The Cortex 7 Console Manual has the details for integrators.

9.10 Alarm history

ALARM HISTORY shows how many entries the history holds. **Clear alarm history** removes the alarms and events; setting changes are kept, and the clearing itself is recorded. It cannot be cleared while an alarm is active. The history itself is on the ALARMS screen (chapter 7).

9.11 Service snapshot

With a USB stick inserted, choose how many days to cover (7, 30 or 90) and press **Save Service Snapshot to USB**. It writes one file to the cortex-snapshots folder with everything Excell Feeders support needs to see what the unit did: its settings and application, the alarm and change history, the trends and system logs over those days, the versions and the panel's health. Passwords and the PIN are left out. Send the file to Excell Feeders support when asked; 7 days is enough unless they ask for more.

9.12 Paid options

Modbus TCP, EtherNet/IP, IIoT MQTT and LTE are options. Each stays off until an activation key from Excell Feeders turns it on. A key works on one panel only, needs no internet connection and does not expire. Several keys add up.

1. Find the panel's serial number under SERVICE → **OPTIONS** and order the key from Excell Feeders with it.
2. Copy the key file (**cortex-activation-<serial>.txt**) to the top folder of a USB stick and insert it in the panel.
3. Under SERVICE → **OPTIONS**, tap **Activate** next to the file.
4. Switch the option on in its own settings. The activation is recorded under ALARMS → Changes.

10 Care and troubleshooting

10.1 Care

- Clean the touchscreen with a soft, damp cloth. Do not use solvents or abrasive cleaners.
- Do not remove power while a software update is being written. If power is lost during an update, the panel starts the previous version.
- The panel protects its settings against power loss; no shutdown procedure is needed in normal operation.

10.2 Troubleshooting

Symptom	What to do
Screen blank after power-on	Wait two minutes. If it stays blank, check the panel's power. Then switch the power off and check the HDMI and USB cables, which can work loose in shipping: pull each one out and plug it firmly back in, at both the back board and the touchscreen. Switch the power on again. If the screen is still blank, contact support.
"Controller offline" banner	Check the controller's power. The controller runs independently; contact support if the banner stays.
SET UP THIS CORTEX 7 instead of HOME	The controller has no application: install it (chapter 4).
The front panel's lights chase round	The controller has no application running; its outputs are off.
A change shows "did not confirm"	The controller did not accept the value. Check the controller is online and try again.
"Controller Firmware Not Running" alarm	Install controller firmware from a USB stick (section 9.2).
A software file is refused as not signed	Use the file as released by Excell Feeders; copy it to the stick again, or ask support for a new copy.
Service PIN lost	Contact Excell Feeders support.
Panel returned to the previous version after an update	ALARMS → Changes gives the reason. Save a service snapshot and contact support.
Wrong time on alarms	Set the time and time zone (SERVICE → DATE & TIME).
Analog reading off	Check the transmitter and its scaling, then calibrate the input (section 9.6).

10.3 Heartbeat light

The heartbeat light on the controller board shows its state, for service with the enclosure open. It is at the top right of the board, marked HEARTBEAT LED.

Light	Meaning
Blinking fast	Running, connected to the panel.
Blinking slowly (about once every 2 seconds)	Running, the panel not connected. The machine keeps running on its settings.
On steady	Waiting in update mode, outputs off (section 9.2).
Off, or stopped blinking	No power, or the controller is restarting. Contact support if it stays that way.