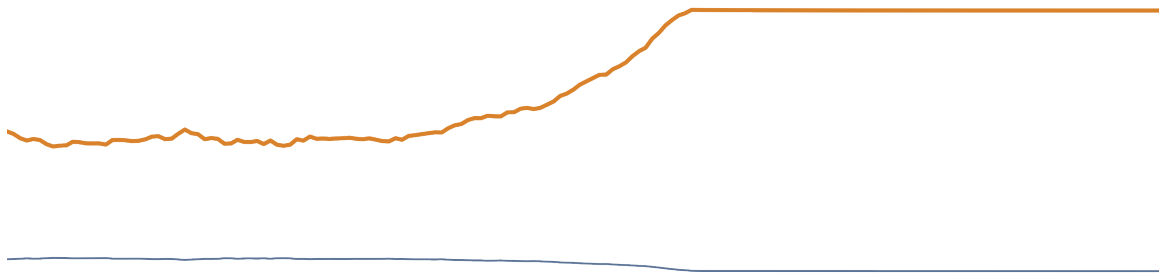




PDsoft v3.0b



User Manual

*Control software for the Matelect CGM-7 and DCM-2 crack growth monitors
Covers connecting a CGM-7 or DCM-2, configuring a test, recording, notes, reviewing old data files, the
Data & Plot window, and viewing/controlling PDsoft remotely with PDsoft v3 Remote.*

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1. INTRODUCTION

PDsoft v3 is Matelect's control software for two crack growth monitors: the CGM-7 (AC Potential Drop / ACPD) and the DCM-2 (DC Potential Drop / DCPD). It configures whichever unit you're using over a serial connection, plots live readings, and records measurement data to disk for a crack growth test. A single session can run several Setups at once, mixing CGM-7s and DCM-2s freely.

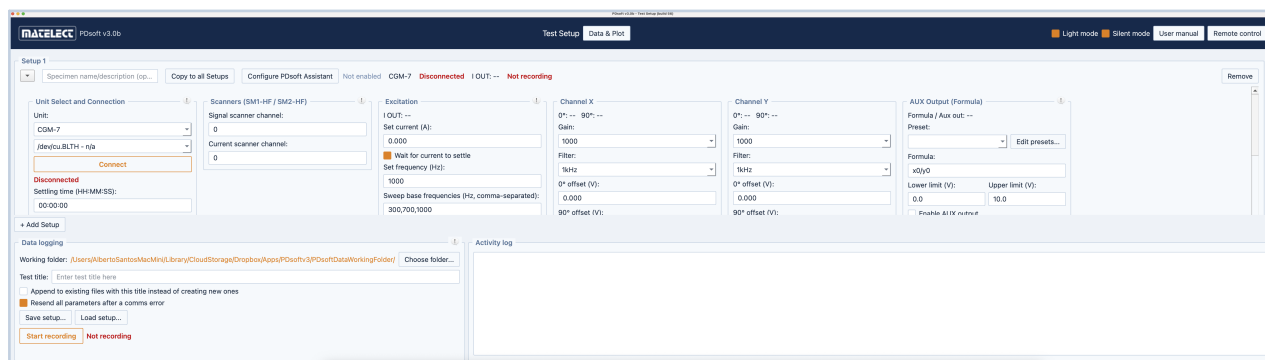
The app has two windows that work together and stay in sync wherever you are in a test:

- **Test Setup** – connect to hardware, configure each Setup, and start or stop recording.
- **Data & Plot** – watch live readings on a chart, review full test history, add notes, open old data files, and start or stop recording from here too.

Switch between them any time with the button in the header (“Data & Plot” / “Test Setup”) – nothing you're doing gets interrupted. A third way to reach PDsoft is **PDsoft v3 Remote** (Section 10) – a web page, anywhere, for viewing and controlling this app when you aren't sitting at this computer.

Note:

Sections 4 and 6 onward cover things that work differently, or aren't available at all, depending on which unit a Setup is using – look for the CGM-7/DCM-2 labelling on each section and sub-section.



The Test Setup page (build 81) – one Setup shown, CGM-7 controls.

2. GETTING STARTED

2.1 Installing PDsoft

PDsoft v3 runs on both Mac and Windows. Installation is a one-off, per-computer step – once installed, everything else in this manual is the same on both platforms.

- **Mac:** open the .dmg file and drag PDsoft v3.0b into Applications, then see the note below – the first launch on each Mac needs a few extra steps.
- **Windows:** downloading and then running the installer each trigger their own security warning the first time, since it isn't code-signed – see the note below for exactly what to click through at each step.

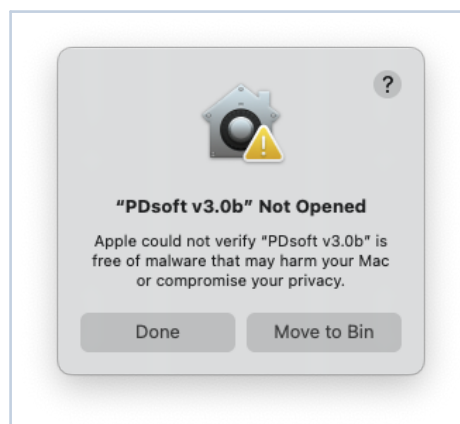
The first Mac launch needs a few extra steps:

PDsoft isn't signed with a paid Apple Developer certificate yet, so the first time you open it on a given Mac, macOS blocks it outright rather than just warning you – double-clicking (or even right-clicking and choosing Open) shows “PDsoft v3.0b' Not Opened”, saying Apple could not verify it's free of malware, with only **Done** and **Move to Bin** as options.

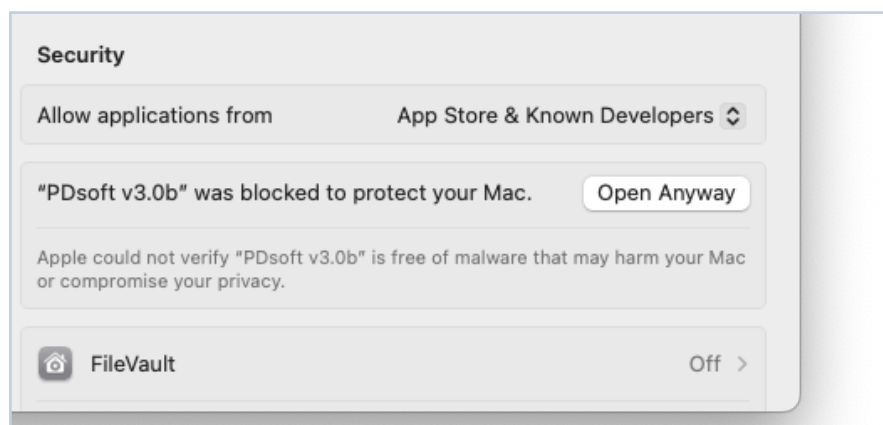
Click Done (not Move to Bin), then:

1. Open **System Settings** → **Privacy & Security** (scroll down the left-hand list if you don't see it).
2. Scroll all the way down that page to the **Security** section, near the bottom.
3. You'll see a line reading “PDsoft v3.0b' was blocked to protect your Mac” with an **Open Anyway** button next to it – click it.
4. Enter your Mac login password when prompted, then confirm.

PDsoft now opens normally from Launchpad or by double-clicking, same as any other app – this is only needed once per Mac, the first time.



Step 1: click Done, not Move to Bin.



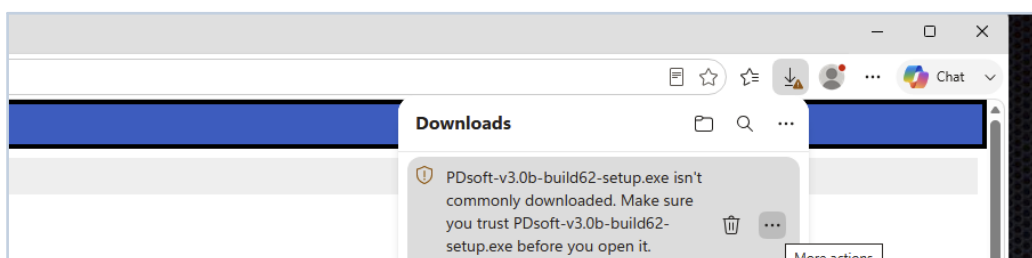
Steps 2-3: System Settings → Privacy & Security → Security section → Open Anyway.

Windows blocks in two separate places, not just one:

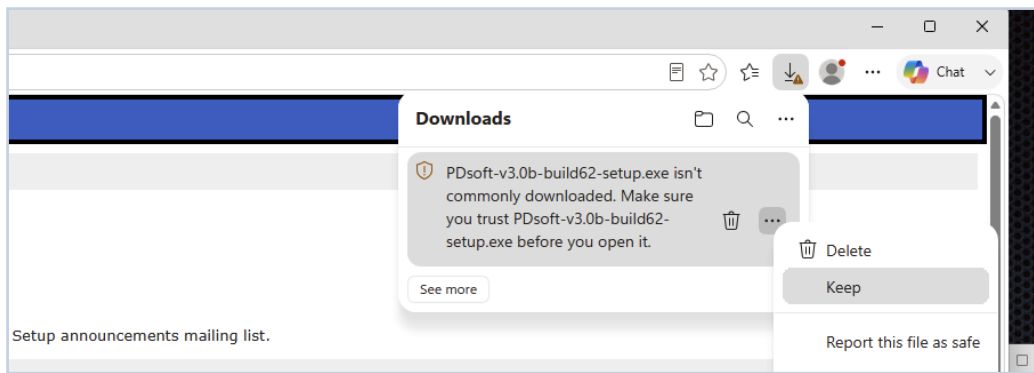
PDsoft isn't code-signed yet, so Windows warns twice – once when you download the installer, and again when you run it. Neither means anything is actually wrong.

1. Downloading it – your browser (Edge, Chrome, etc.) shows “PDsoft-v3.0b-buildNN-setup.exe isn't commonly downloaded. Make sure you trust...” and won't save the real file yet. In Edge: hover over the download entry in the Downloads panel, click the ... (“More actions”) button that appears on it, then click **Keep** in the menu. Chrome shows an equivalent warning with its own similarly-worded “keep” option.

2. Running it – once actually saved, double-clicking the installer shows “Windows protected your PC” (SmartScreen). Click **More info**, then **Run anyway** to continue with the install wizard.



Step 1: hover the download, click its ... (More actions) button.



Then click Keep in the menu that appears.

The NI-DAQmx driver checkbox (Windows only):

The Windows installer has an optional, unticked-by-default checkbox to also download and install the NI-DAQmx driver. This is **only needed for the MCI-1e Load Sync feature** (Section 4.5) – everything else in PDsoft works without it. Leave it unticked if you're not using Load Sync; if you change your mind later, you can install the driver at any time from ni.com, or by running the installer again.

2.2 What you need

- A CGM-7 and/or a DCM-2, connected to this computer over a serial port (typically a USB-to-serial adapter).
- A folder on disk to write test data into (the “working folder”).

2.3 Choosing a working folder

In the Setup page's Data logging box, click “Choose folder...” and pick where test data should be written. Every Setup organises its own files under this one folder automatically – you only choose it once per session, not per Setup.

2.4 Connecting a CGM-7

- Open the Test Setup page.
- In “Unit Select and Connection”, leave Unit set to CGM-7.
- Pick the correct serial port from the dropdown (it refreshes automatically when opened).
- Click Connect.

Once connected, the status line turns green and shows the port and the CGM-7's serial number. Whatever is already in the Excitation/Scanners fields is pushed to the hardware automatically right after connecting.

2.5 Connecting a DCM-2

- Open the Test Setup page and set this Setup's Unit dropdown to DCM-2 – the whole box changes to the DCM-2's own connection controls.
- Pick the correct serial port and click Connect.
- Once connected, PDsoft automatically reads the unit's identity (model, serial number, firmware, current rating, channel count) and shows it under the status line.
- PDsoft puts the DCM-2 into RS232 mode 3 when it connects, whichever of its four RS232 modes (0–3) it was in – mode 3 is the only one that sends every reading, temperatures included. There's nothing to set, and the Activity log records the change. Connecting to a unit in mode 1 (DCM-1 compatibility) takes a few seconds longer. The unit keeps mode 3 until it's switched off, then returns to its own default mode, so equipment that relies on another mode works again after a power cycle.

Important – DCM-2 gives no live data until it's running:

Unlike the CGM-7, a DCM-2 produces absolutely no telemetry while stopped. After connecting, click Run (reset offset) or Resume run (keep offset) in the DCM-2 Excitation box (Section 5.2) before expecting any readings on the chart. PDsoft will also prompt you for this automatically the first time you start recording a DCM-2 Setup that isn't already running.

3. ADDING, REMOVING, AND CHOOSING A UNIT FOR A SETUP

Each instrument you're working with gets its own collapsible "Setup" row. Click "+ Add Setup" at the bottom of the list to bring in another one – useful for running several instruments side by side, mixing CGM-7s and DCM-2s, or for switching between several specimens sharing one unit (see Section 6).

Only one Setup row is ever expanded at a time:

Expanding a row automatically collapses whichever one was open before - clicking "+ Add Setup" expands the new one straight away, the same way. This keeps the screen from filling up with every Setup's full control panel at once when running several side by side - a collapsed row still shows a summary of what it's actually set to (current, gain, filter, offsets, settling/averaging, scanners, and sync state, in the same left-to-right order as the expanded panel's own group boxes) right underneath its title, so you don't need to expand it just to check.

A handful of these values are editable right on the collapsed row – Current, Frequency (CGM-7), Scanner channels, and Settling/Averaging time all sit in their own small boxes rather than as plain text: click in, type, and press Enter or click elsewhere to apply, exactly as in the full panel. This is meant for a large session (16 or more Setups) where expanding every single row just to tweak one number gets tedious – the point of collapsing them in the first place. Editing here and editing the same field in the expanded panel are the same thing: either one updates the other immediately, and a current typed in here still goes through the same checks as everywhere else (for example, it won't re-energise a CGM-7 that's currently parked at 0 A between turns of a mixed session – Section 7.4). Gain/Filter, the offsets, Sync mode, and the live Formula reading are not editable here – expand the row for those.

A collapsed Setup row with realistic values set: Settle, Avg, the two Scanner channels, Current, and Frequency (outlined boxes) are all editable right here, without expanding the row.

Setup 1	
▶ Specimen name/description (opt...)	Copy to all Setups
Configure PDsoft Assistant	Not enabled CGM-7 Disconnected I OUT: -- Not recording Remove
Settle 00:00:00 · Avg 00:00:00 · Scanners Sig: 0 Cur: 0 · 0.000 A · 1000 Hz · X: Gain 1000 Filter 1kHz Offset 0.000V/0.000V · Y: Gain 1000 Filter 1kHz Offset 0.000V/0.000V · Sync: Off · Formula: --	

Setup 2	
▶ Specimen name/description (opt...)	Configure PDsoft Assistant
Not enabled DCM-2 Connected I OUT: 5.000 A Setup 2 - Waiting for current to settle... Remove	
Settle 00:00:00 · Avg 00:00:00 · Scanners Cur: 0 Volt: 0 · 5.000 A · Current settle 100 ms · X: Range 0 Offset 0 µV · Y: Range 0 Offset 0 µV · Filter 64/2 (readings/samples) · Sync: Free Running (FREE RUNNING MINIMUM FILTER) · Formula: 0.4210	

Setup 3	
▶ Specimen name/description (opt...)	Configure PDsoft Assistant
Not enabled CGM-7 Disconnected I OUT: -- Not recording Remove	
Settle 00:00:00 · Avg 00:00:00 · Scanners Sig: 0 Cur: 0 · 0.000 A · 1000 Hz · X: Gain 1000 Filter 1kHz Offset 0.000V/0.000V · Y: Gain 1000 Filter 1kHz Offset 0.000V/0.000V · Sync: Off · Formula: --	

Three collapsed Setup rows during a recording session. Only one Setup is working at a time – here Setup 2, a DCM-2, is waiting for its current to settle (shown in orange) while the other two are idle. The summary line under each ends with the live Formula value.

On the row's title line, the Setup's recording status is shown after its connection state and current reading. During a recording session, the Setup whose turn it is has its status in orange, slowly fading in and out, for the whole of its turn – setting parameters, settling, waiting for its current to settle, averaging and recording – so you can always see at a glance which Setup is active, CGM-7 or DCM-2. The others show “Idle – waiting for its turn” in grey.

The text field right next to each row's collapse arrow is that Setup's own title – free text, e.g. a specimen name, purely optional. It doesn't replace “Setup 1”/“Setup 2” and so on (that stays as the stable identifier used everywhere else, like the Activity log), it's appended to it in that Setup's own output folder name instead, e.g. “Setup 1 - Bracket A” – useful for telling files apart later when running many Setups at once, without having to remember which number was which specimen.

The Unit dropdown at the top of each Setup row picks CGM-7 or DCM-2 – the rest of that row's controls swap to match (Section 4 for CGM-7, Section 5 for DCM-2). Switching a connected Setup's unit disconnects it first.

Click Remove on a Setup's row to take it out of the session entirely – this disconnects it and takes it out of its shared-hardware group if it's in one. PDsoft refuses to remove the last remaining Setup, refuses to remove a Setup that's currently recording (stop its recording first), and refuses to remove Setup 1 specifically, always - Setup 1 stays for the life of the session, guaranteed.

Setup 1 gets one more thing the rest don't: a “Copy to all Setups” button, right beside its own collapse arrow. Click it to copy Setup 1's own settings (unit, port, current/frequency, gains/filters/offsets, scanner channels, AUX/Formula – including any preset constants, Section 4.4/5.6 – settling/averaging times, and more) onto every other currently-existing Setup at once – useful for setting up many identical channels without re-typing every field by hand. Each Setup's own title (above) is deliberately left untouched, since that's meant to stay different per Setup - but the port IS copied now: several Setups sharing one physical unit's port is the normal case (Section 6), not a mistake to guard against, so copying Setup 1's port onto the others is what lets them join its shared-hardware group instead of needing the same port typed in by hand. Only covers Setups that already exist when you click it - add any more afterward and use it again if they should match too. Refuses if any of the other Setups are currently recording.

Won't overwrite a Setup you've already customized by hand:

Once you've hand-edited any field on a Setup (after it received a copy, or from new), that Setup is left alone by every later click of "Copy to all Setups" - only Setups that haven't been individually touched since their last copy actually get overwritten. This is what makes the recommended workflow for "several near-identical channels, a couple with small differences" actually safe: add every Setup you need first, click "Copy to all Setups" once while none of them have been touched yet, *then* go into each one and change just the field or two that should differ - a later Add Setup + Copy (e.g. to bring in one more identical channel) won't re-overwrite the ones you've already customized. The confirmation dialog always says exactly which Setups will actually be copied to and which are being left alone, so nothing happens by surprise.

Multiple instruments, one specimen:

The first time a session grows to two or more Setups, PDsoft shows a one-time reminder that connecting more than one instrument's excitation signal to the same physical specimen at once needs deliberate care – their signals can interfere with each other's readings. Nothing is blocked; it's a reminder, not a validation error, and it only shows once per session (see Silent mode, Section 7.1, to suppress it and every other advisory pop-up entirely). Recording itself is always one Setup at a time (Section 7.4), and when a session has both CGM-7 and DCM-2 Setups PDsoft also parks whichever kind isn't taking its turn - CGM-7s at 0 A, DCM-2s stopped (Section 7.4). It still can't know which specimen each instrument is wired to, so keep the wiring sensible.

4. THE SETUP PAGE – CGM-7 CONTROLS

4.1 Unit Select and Connection

Selects the unit type, serial port, and shows live connection status.

- Port dropdown – refreshes its list automatically each time you open it.
- Connect / Disconnect – opens or closes the serial connection.
- Settling time / Averaging time (HH:MM:SS) – how long this Setup settles and averages on each recording lap (see Section 7.4). Leave both at 00:00:00 to record every reading continuously – but only if “Wait for current to settle” (Section 4.2) is also unchecked; see that section's own note for why it can silently override 00:00:00 on its own.

4.2 Excitation

A value you type is sent to the instrument when you press Enter or click out of the field. Pressing Enter sends it even if it hasn't changed – the way to re-send a setting, for instance after a comms problem; clicking out of an unchanged field sends nothing. The same goes for the DCM-2's fields (Section 5).

Sets the CGM-7's AC excitation current and frequency.

- Set current (A) – the excitation current setpoint.
- “Wait for current to settle” – waits for the live current reading to actually stabilise near the setpoint before recording starts, instead of trusting a fixed timer (different ACPD setups can settle at different rates). Gives up and proceeds anyway after 60 seconds if the reading never gets close. If a settling time is also set, it becomes a minimum wait rather than being skipped.
- Set frequency (Hz) – the excitation frequency.
- Frequency sweep – when enabled, recording steps through a series of frequencies (each base frequency ×10 repeatedly up to the stop frequency) instead of recording at one fixed frequency. Requires a settling time to be set. Every frequency must be within the CGM-7's 10 Hz – 500 kHz: the list below the boxes turns red as soon as one isn't, and Start recording refuses it. If a frequency can't be set during a test (a comms problem), it is skipped with an error in the Activity log and the sweep carries on with the next one.

Zero settling/averaging time isn't always instant:

“Wait for current to settle” is checked by default and runs independently of the Settling time field (Section 4.1) – even with Settling time at 00:00:00, it still waits for 5 consecutive readings to land within 0.002A of each other and near the setpoint before a row is logged. At roughly 3 readings/second that's a floor of about 1.5–2 seconds per row even on a clean signal, and a genuinely variable, longer wait on a noisier one – a single reading that breaks tolerance restarts the count of 5. If you want truly continuous, one-row-per-reading recording (e.g. a single Setup, not scanning, no settling behaviour wanted at all), uncheck “Wait for current to settle” as well as leaving both time fields at 00:00:00 – either alone isn't enough.

4.3 Scanners (SM1-HF / SM2-HF)

Sets the signal and current scanner channels. Channels are numbered from 0, not 1, matching the CGM-7's own documentation.

4.4 AUX Output (Formula)

Drives the CGM-7's AUX analog output (0–10V) from a formula computed from live readings, and always evaluates and records that formula's value as its own channel (“AUX (formula)”) whether or not the output itself is enabled. The live readout at the top of the box (“Formula / Aux out: —”) updates on every reading while AUX output is off; once enabled, it updates instead each time the output is actually written (Section 4.4's own Enable AUX output bullet below - roughly every other reading), which keeps the readout's format stable rather than visibly flicking between two different layouts at the reading rate.

- **Preset** – picks a formula from the list and drops it straight into the Formula field below, still freely editable afterward. Ships with X/Y (the default) plus Thick Skin and two Thin Skin variants - see the note below. Add your own with the “Edit presets...” button next to the dropdown, which opens your own preset file; new entries appear in this dropdown the next time PDsoft starts.
- **Formula** – defaults to x0/y0. Available variables: current, x0, x90, y0, y90, L – L is the live MCI-1e Load Sync signal (Section 4.5) if enabled, or NaN (shown as “—”) if not.
- **Lower/upper limit (V)** – clamps the physical output.
- **Enable AUX output** – turns the physical output on. Updates at half the CGM-7 reading rate, since each write is a second full command round-trip on the same serial link.

The AUX Output (Formula) box: the live readout at the top, the Preset dropdown with its Edit presets... button, and the Formula field.

Verify a preset before trusting its numbers:

Thick Skin, Thin Skin (Simplified), and Thin Skin (Dover) are formulas sourced from published crack-sizing literature, not measured/confirmed against this specific probe geometry - a popup appears when you pick one, both to collect the constants it needs (pin spacing, correction factor, reference readings, ...) and to remind you of this. Check a preset's numbers against known calibration data before trusting it for a real test. Both Thin Skin presets deliberately leave one variable (V, or V1/V2) undefined in the Formula field until you edit it in by hand - the exact live channel(s) that variable should map to for your probe setup hasn't been confirmed, so the formula errors clearly rather than silently guessing.

Typing your own formula. The Formula field accepts any single mathematical expression built from the live variables, numbers, and functions below. Press Enter (or click out of the field) to apply it; the readout at the top of the box then shows the result on every reading.

- **Variables** – current, x0, x90, y0, y90, L. Names are case-sensitive and lower-case: X0 is not recognised.
- **Operators** – + – * / and brackets. Use ** or ^ for “to the power of” (x0**2 and x0^2 are both x0 squared). A leading name for the result, such as x =, is ignored.
- **If a formula can't be calculated** – its box is outlined in red, hovering over it gives the reason, the Activity log says so once, and the readout shows “can't calculate” instead of a value. That applies however the formula arrived: typed, picked from a preset, loaded from a setup file, or set from PDsoft v3 Remote.
- **Constants** – pi and e, plus plain numbers written normally (0.5, 1e-3).
- **Functions** – always with brackets, in lower case: abs, sqrt, exp, ln (natural log), log (base 10), log2, pow, min, max, sin, cos, tan, asin, acos, atan, atan2, sinh, cosh, tanh, asinh, acosh, atanh, ceil, floor, int (rounds to nearest), mod, sign, and the other standard functions listed in the AUX Output box's info icon.

Formula	What it gives
$x0/y0$	Ratio of the two in-phase readings (the default).
$\sqrt{x0^{**2} + x90^{**2}}$	Magnitude of the X channel signal, in-phase and quadrature combined.
$\sqrt{x0^{**2} + x90^{**2}} / \sqrt{y0^{**2} + y90^{**2}}$	Ratio of the X channel magnitude to the Y channel magnitude.
$\text{atan2}(x90, x0)$	Phase angle of the X channel, in radians.
$100 * (x0/y0 - 1)$	Percentage by which the ratio differs from 1.
$(x0/y0) * 1.0234$	The ratio scaled by a fixed correction factor typed in as a plain number.

If a formula can't be evaluated – an unknown name, a division by zero, a misplaced bracket – the readout shows “—” instead of a number. If AUX output is enabled at that moment PDsoft also stops driving it and shows a message giving the reason, so a typing slip can never leave the output sitting on a stale value.

Adding a formula to the Preset list. A formula you'll use again can be added to the Preset dropdown so it's one click next time. Click **Edit presets...** beside the dropdown; your own preset file, `my_cgm7_formulas.txt`, opens in your default text editor (PDsoft creates it, with a short explanation at the top, the first time you click). Add a new section at the end and save the file; open the Preset dropdown again and the new name is there – PDsoft re-reads the file each time the dropdown opens, so there's no need to restart it. The file is plain text, one section per preset, laid out like this:

```
# Lines starting with # are comments and are ignored.

[Amplitude ratio]
formula = sqrt(x0**2 + x90**2) / sqrt(y0**2 + y90**2)

[Normalised X0]
formula = x0 / X0ref
constants = X0ref:X0 reading at the start of the test

[Linear crack calibration]
formula = a0 + K * (x0/y0 - R0)
constants = a0=0:Start depth (mm), K=25:Slope (mm per unit ratio), R0=1:Start ratio
```

The three entries above show every part of the format (the values are illustrative only – use your own calibration figures):

- **[Section name]** – the name in square brackets, on a line of its own, is what appears in the Preset dropdown. Give each preset a different name.

- **formula =** – required, on a single line, and written exactly as you would type it into the Formula field.
- **constants =** – optional. Lists numbers the formula needs that aren't live readings, separated by commas. Each entry can be written as NAME, NAME=default (starts pre-filled with that number), NAME:description, or NAME=default:description. The description is shown beside the entry box – don't put a comma inside one, because commas separate the entries. Constant names follow the same rules as variables: letters, digits and underscores, not starting with a digit, case-sensitive.
- When you pick a preset that has constants, a small popup asks for each value. Type it in, or use **Capture from...** to fill it from this Setup's most recent live reading of a chosen variable (handy for a reference value recorded at the start of a test). The values are stored with the Setup and are saved and restored by Save setup... / Load setup... (Section 7.1).
- A constants popup only exists for presets. A formula typed straight into the Formula field can't use named constants – write the numbers into it directly.

Confirm any formula against known calibration data before trusting the crack-size values it produces.

S: or **Capture from...**

Pin spacing between the active and reference probes (mm)

Cr: or **Capture from...**

Correction factor

OK **Cancel**

The popup shown when a preset with constants is picked (Thick Skin here): one entry per constant, with its description beneath and a Capture from... dropdown.

Things that stop a preset loading:

A section with no **formula =** line, or containing a percent sign (%) anywhere in it, is skipped and doesn't appear in the dropdown – the other presets still load normally. To get a remainder, use `mod(a, b)` rather than %. Don't put a comment at the end of a formula line, either (`formula = x0/y0 # ratio`) – everything after **formula =** is read as part of the formula. Put comments on their own line starting with #.

Adding a preset from PDsoft v3 Remote:

You don't have to be at the PC. The web page's own Formula panel (Section 10.3) has a **Save preset** button that writes the same file for you – useful when the instrument is running in a lab you're not in. It checks the formula before saving and tells you what's wrong if it won't save, and the new preset appears in this dropdown straight away. Your own presets can be changed or deleted from there too; PDsoft's built-in ones can't (an update would replace them anyway).

Where your presets are kept:

Your own preset files live in your user folder, not inside PDsoft, so installing a newer build never overwrites them – on a Mac in ~/Library/Application Support/Matelect/PDsoftv3, on Windows in %APPDATA%\Matelect\PDsoftv3 (typically C:\Users\your name\AppData\Roaming\Matelect\PDsoftv3). PDsoft's built-in presets load first, then yours; giving one of yours the same [name] as a built-in one replaces it. To share a preset with a colleague, send them that section of the file to paste into theirs.

4.5 MCI-1e Load Sync (NI DAQ)

For fatigue tests driven by a load frame: reads an analog input on an NI-DAQmx device (e.g. a USB-6000) connected to the load signal, counting mechanical cycles and capturing the CGM-7 reading taken just as the signal leaves the chosen sync point (positive peak, negative peak, or a zero crossing). The cycle count and load signal value are written as columns in the processed data file (Section 9.1).

Digital output trigger (in the same box) is independent of sync – it sets one of the unit's digital output lines high once a formula's value reaches a threshold, using the same formula syntax (and the same L variable) as AUX Output above.

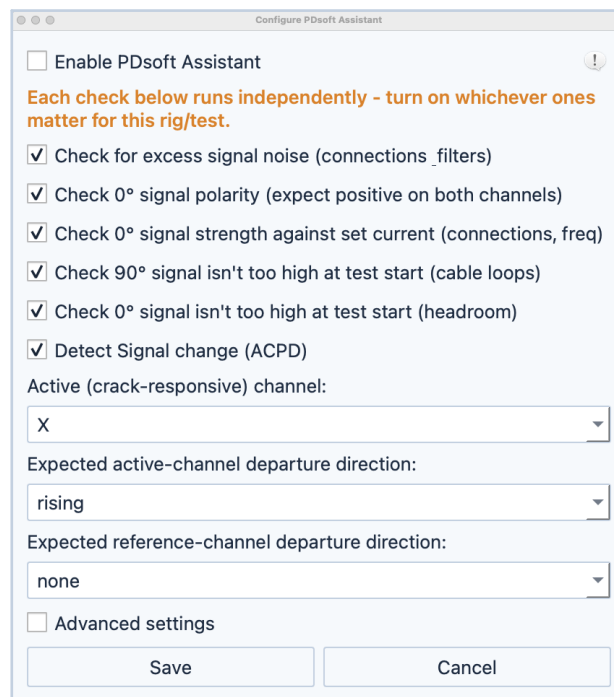
No MCI-1e connected:

If Load Sync isn't enabled, L simply evaluates to NaN (shown as “—”) in any formula that references it, rather than an error – a formula written to use L is safe to leave in place whether or not Load Sync happens to be running.

4.6 PDsoft Assistant

Watches this Setup's own 0°/90° X/Y channels via up to six independent checks, each its own checkbox – equipment-setup sanity checks plus one genuine Signal-change detector. Off by default. Runs whether or not this Setup is actually recording – useful for catching equipment problems while still setting up a rig, not just once a real test has started. This section covers the CGM-7 version; see Section 5.7 for the DCM-2 counterpart, which watches for the same underlying fault but via a different check list suited to DC.

A single **Configure PDsoft Assistant** button, on this Setup's own top header line beside “Copy to all Setups”, is the whole entry point – it's also where Enable/Disable and an info icon now live (see below), not as separate buttons. Only a live status readout (not enabled / establishing baseline / watching / found something) stays next to that button; everything else is inside the dialog it opens.



The Configure PDsoft Assistant dialog, all six checks enabled.

■ **Enable PDsoft Assistant** – a checkbox at the top of the dialog, turning everything below on or off together. An info icon next to it explains all six checks at a glance.

■ Six check checkboxes, each independent – turn on whichever combination matters for this rig/test (see below for what each one does).

■ **Detect Signal change (ACPD)** is the only one with its own extra commissioning fields (active channel, expected departure directions) and its own Advanced-mode tuning knobs (baseline window, tolerance multiplier, persistence, rolling window) – both shown only while its own checkbox is checked, since they mean nothing to the other five checks.

■ **Advanced settings** also reveals a handful of always-relevant tuning constants (absolute noise floor, expected 0° V per A of current, the 90°/0° test-start thresholds, and the current/filter settle

times) – sensible starting points from the source procedure or ordinary engineering judgement, not measured constants, and not normally something to touch.

- Saving new settings while already enabled restarts PDsoft Assistant with fresh baselines under the new settings, rather than leaving stale ones running.

The six checks

- **Check for excess signal noise (connections & filters)** – once the active channel's own short baseline is ready, compares its measured noise against the configured absolute noise floor; if the real signal noise is what's limiting sensitivity (not the floor), suggests moving up a filter step – 1kHz → 80Hz → 0.1Hz – on that channel (or notes it's already at the strongest filter). Checked once per baseline.

- **Check 0° signal polarity (expect positive on both channels)** – both 0° components should read clearly positive (above the noise floor, not just technically above zero – a genuinely disconnected/floating probe can land on either side of exactly zero by pure noise chance, so a strict “>0” alone let a borderline reading slip through on one channel but not the other). Also flags a CGM-7-reported overload on either channel (the same “[OVERLOAD X]”/“[OVERLOAD Y]” flag shown next to I OUT) – a disconnected pin doesn't always read as a small negative number, it can just as easily rail to the amplifier's own limit instead, which still “looks positive” to a sign-only check.

- **Check 0° signal strength against set current (connections, freq)** – both 0° readings should scale with the set excitation current (a tunable V-per-A expectation in Advanced settings); a reading well below that usually means current and/or gain is set too low for a trustworthy signal. No excitation set has nothing to compare against, so this stays silent then. Waits for the signal to actually settle after a current or filter change before judging anything – a slower filter (80Hz/0.1Hz, a real analog stage, not just display smoothing) needs measurably longer to settle than 1kHz, each with its own tunable settle time in Advanced settings.

- **Check 90° signal isn't too high at test start (cable loops)** – a one-time glance, right at the start of a test, at whether either channel's 90° component is already above 1V (tunable) – usually means a cable loop picking up stray coupling.

- **Check 0° signal isn't too high at test start (headroom)** – the same one-time glance at whether either channel's 0° component already starts above 1.5V (tunable) – leaves little headroom before hitting the amplifier's own limits once a real crack signal grows on top of it; suggests reducing gain, current, and/or frequency.

- **Detect Signal change (ACPD)** – the original procedure this whole feature started as (see below for the full detail).

How a finding is shown

Every finding always gets an Activity log line and a chart marker, using the same notes feature covered in Section 8.6 – so it shows up everywhere a note does: the Activity log, a marker on the chart, and the data file's own “note” column (Section 9.3), including on PDsoft v3 Remote. This happens whether or not the Setup is currently recording – the chart marker doesn't need an open file to appear, only the data-file note column does.

- The five equipment-setup checks (everything except Signal change) also show a popup – a “Don't show this again for this Setup” checkbox on it silences that one kind for the rest of the session without silencing its Activity log line. A popup fires again on a genuinely new problem later in the same session (goes away, then comes back), not just once ever.
- Popups fall back to log/note-only in three cases: Silent mode is on, this Setup is actively recording (a live/attended-but-running test shouldn't get interrupted mid-run any more than a Signal-change finding does – popups stay useful during setup, before Start recording, when someone's actually there watching), or that popup kind has been dismissed with its own “Don't show this again”.
- Signal-change findings are never a popup, ever, recording or not – matches how this app handles every other background condition during a live test, so an unattended overnight session is never left waiting on a dialog nobody's there to click.

Chart/log markers stay short by design:

Findings are worded briefly so a marker can never overrun the chart it's drawn on. Any note longer than 40 characters – from PDsoft Assistant or typed in by hand – is shown truncated with “...” on the chart itself (desktop and PDsoft v3 Remote alike); the full, untruncated text is always in the Activity log and the data file's “note” column.

Detect Signal change (ACPD), in detail

This isn't a generic algorithm – it's a direct port of a hand-derived analysis of a real fatigue test, one of potentially several such *procedures* over time as more tests get analysed the same way (only one exists today). Confirm any result against known crack-growth data before trusting it, same as a formula preset.

A baseline is established once, from the first ~15 readings after enabling (only while the specimen is actually being loaded – see below) – frozen from then on for the rest of the test, exactly like the offline analysis this was ported from. Once a sustained departure is detected:

- “Possible Signal change detected” – the active channel alone.
- “Possible Signal change detected (confirmed)” – the reference channel is also moving the expected complementary way at the same time, a real physical corroborating signal (current being diverted from the reference path as the crack forms on the active path), not just the active channel on its own.

Pauses in loading (a load frame paused or holding, not actively fatiguing) are excluded from both the baseline and the ongoing detection, so a paused specimen can't be misread as either a settled signal or a real departure. Uses the real MCI-1e Load Sync signal (Section 4.5) when this Setup has Sync enabled; falls back to a simpler noise-level check otherwise, since a real Sync signal is always more reliable when available.

A current or filter change restarts the baseline:

A baseline frozen at the old current level is, by design, a fixed reference for the rest of the test - so bumping current up or down genuinely, legitimately shifts the real signal to a new level that has nothing to do with an actual crack, which the algorithm can't otherwise tell apart from a real departure. Changing the current or either channel's filter while PDsoft Assistant is already enabled restarts it with a fresh baseline instead - exactly like saving new settings does - and waits for the signal to settle first (the same settle time the current-strength check above uses) before that fresh baseline starts collecting readings, so the transient ramp itself can't get baked into it either.

Assumes a fixed frequency for the whole test:

Each baseline is for one specific channel pair at whatever frequency the Setup happens to be at when it's established. Not a good fit for a Setup with frequency sweep enabled – a warning is logged if both are on at once, but results shouldn't be trusted in that combination for now.

5. THE SETUP PAGE – DCM-2 CONTROLS

Selecting DCM-2 in a Setup's Unit dropdown replaces every CGM-7 box above with the DCM-2's own controls, laid out in the same order (Connection, Scanners, Excitation, Channel X, Channel Y, Filtering, Formula Output). Nothing here shares state with the CGM-7 side.

The screenshot displays the DCM-2 Setup controls interface, organized into several panels:

- Unit Select and Connection:**
 - Unit: DCM-2 (dropdown)
 - Connect button
 - Connected status
 - Settling time (HH:MM:SS): 00:00:00
 - Averaging time (HH:MM:SS): 00:00:00
 - Help (HEL) and Read all variables (RAV) buttons
- DCM-2 Scanners:**
 - Current scanner channel: 0
 - Voltage scanner channel: 0
- DCM-2 Excitation:**
 - I OUT: 5.000 A
 - Set current (A): 5.000
 - Wait for current to settle checkbox (checked)
 - Run (reset offset) button
 - Resume run button
 - Stop button
 - Current settling time, ms (2-20000): 100
 - Mark/space delay, ms (1-65000): 1
 - Reversing mode checkbox
- DCM-2 Channel X:**
 - X: --
 - Voltage range: 0
 - User offset (μV, -5000 to +4999): 0
- DCM-2 Channel Y:**
 - Y: --
 - Voltage range: 0
 - User offset (μV, -5000 to +4999): 0
- DCM-2 Filtering:**
 - Active channels: 2
 - Filter readings (1-255): 64
 - Filter samples (1-255): 2
 - Sync mode (SCM): FREE RUNNING MINIMUM FILTER
 - Load Pk-Pk (V): 10
 - Load offset (V): 0
- DCM-2 Formula Output:**
 - Formula: 0.4210
 - Preset: (dropdown)
 - Edit presets... button
 - Formula: I

A DCM-2 Setup's controls, one box per topic in the order the sections below describe them (the box layout wraps to suit the window width).

5.1 Unit Select and Connection

- Port dropdown / Connect / Disconnect – as CGM-7. Disconnecting a DCM-2 that is running (or closing PDsoft while it is) sends Stop first, so the unit is never left driving current unattended; if the Stop can't be confirmed, a warning says the unit may still be running.
- Once connected, the unit's Model, Serial number, Firmware, Current rating, and Channel count are read automatically and shown under the status line.
- Settling time / Averaging time – shared fields, same meaning as CGM-7 (Section 7.4).
- Help (HEL) / Read all variables (RAV) – diagnostic commands, useful for confirming the link is alive.

Selecting or opening a Setup that already has a unit and port chosen connects (and, if it's sharing hardware with another Setup, activates) it automatically – there's no need to click Connect by hand every time, though the button is still there if you want it.

5.2 DCM-2 Excitation

- I OUT – live excitation current readout.
- Set current (A) – the excitation current setpoint, validated against the unit's own reported current rating (no separate max-current field to fill in by hand).
- Run (reset offset) / Resume run (keep offset) / Stop – Run and Resume stay highlighted once pressed, marking which run command was last successfully sent. This matters because the DCM-2 gives no telemetry at all while stopped – it's the only way to tell at a glance whether the unit should actually be producing data right now.
- “Wait for current to settle” – the DCM-2 counterpart of Section 4.2's CGM-7 checkbox, same idea and same wording: waits for the live current reading to actually stabilise near the setpoint before recording starts, instead of trusting a fixed timer. Gives up and proceeds anyway after 60 seconds if the reading never gets close. If a settling time is also set, it becomes a minimum wait rather than being skipped. Needs fewer consecutive stable readings than the CGM-7 side (2, not 5) since each DCM-2 reading is already several real seconds apart, not a fast poll.
- Current settling time (ms) and Mark/space delay (ms) – low-level excitation timing parameters.
- Reversing mode – toggles the DCM-2's current-reversing excitation mode. Currently disabled (shown greyed out) while this is validated against real hardware.

5.3 DCM-2 Scanners

Sets the current and voltage scanner channels. As with the CGM-7, channels are numbered from 0.

5.4 DCM-2 Channel X / Channel Y

One box per channel. The live X/Y ratio (X/Y) is shown inline on the Channel X box, next to the X reading, rather than duplicated on both boxes.

- Voltage range – relabelled with the unit's real values (e.g. “0 – 4.5mV”) the first time it's connected.
- User offset (μV, -5000 to +4999) – per-channel offset.

5.5 DCM-2 Filtering

- Active channels – how many of the unit's channels are in use. Currently fixed at 2 (the only option offered) while this is validated against real hardware.
- Sync mode – one dropdown that sets the DCM-2's sync point, filter readings, and filter samples together in one choice, rather than three separate settings to work out by hand.
- Filter readings / Filter samples – set automatically by the Sync mode preset above; can still be hand-tuned afterward if a named preset doesn't cover what you need.
- Load Pk-Pk (V) – the peak-to-peak span of the signal on the DCM-2's load input (default 10 V, the unit's own power-on setting). Load readings clip at $\pm$ half this value, so set it just above the real signal's span: a smaller span gives a slightly finer load reading.
- Load offset (V) – the DCM-2's load offset setting (default 0). Its allowed range depends on Load Pk-Pk. It has very little effect on the Load reading itself.
- Both fields refuse a value the DCM-2 won't accept, with a message giving the allowed range.

The 24 options are grouped by what they actually mean:

If you're not using an external synchronisation module, three “Free Running” presets are offered, differing only in how heavily filtered the reading is (heavier filtering gives a steadier but slower reading):

Preset	Readings	Samples
Free Running Minimum Filter	64	2
Free Running Medium Filter	64	4
Free Running Maximum Filter	64	8

If you are synced to an external load waveform, pick the row matching your actual load frequency, then Max peak / Zero cross / Min peak for which point in that waveform to sample at (all three sync points within one band use identical readings/samples – only the sample point changes):

Load frequency band	Readings	Samples
0.6Hz–5.5Hz	64	2
5.5Hz–10Hz	32	4
10Hz–20Hz	16	8
20Hz–30Hz	8	16
30Hz–65Hz	15	9
65Hz–130Hz	32	4
130Hz–500Hz	64	2

Each band offers Max peak, Zero cross, and Min peak, giving the 21 synced entries in the dropdown.

5.6 DCM-2 Formula Output

The DCM-2's counterpart to AUX Output (Section 4.4) – a calculated channel only, with no physical output pin to drive (the DCM-2 has no programmable analogue output). Evaluated and recorded on every telemetry tick regardless of anything else, and plottable as its own “Formula” trace.

- **Preset** – picks a formula from the list and drops it straight into the Formula field below, still freely editable afterward. Ships with Johnson - see the note below. Add your own with the “Edit presets...” button next to the dropdown, which opens your own preset file; new entries appear in this dropdown the next time PDsoft starts.
- **Formula** – defaults to I. Available variables: I, X, Y, XY, L (current, the two channels, their ratio, and the load reading from the DCM-2's own built-in load sync).
- **Formula:** — – live readout at the top of the box, always on.

Verify the Johnson preset before trusting its numbers:

Sourced from published DCPD crack-sizing literature, not measured/confirmed against this specific probe geometry - the popup shown when you select it both collects the constants it needs (specimen width, probe spacing, reference readings, ...) and reminds you of this. Check it against known calibration data before trusting it for a real test. It deliberately leaves one variable (V) undefined in the Formula field until you edit it in by hand - the exact live channel that should map to for your probe setup hasn't been confirmed, so the formula errors clearly rather than silently guessing.

Writing your own formula. The Formula field and the preset file work exactly as described for the CGM-7 in Section 4.4 – same operators, same functions, same constants (pi and e), same file layout and rules. Only two things differ: the live variables are I, X, Y, XY and L (upper-case, and case-sensitive), and

your own preset file is `my_dcm2_formulas.txt`, opened by this box's own **Edit presets...** button (kept in the same user folder described in Section 4.4). If a formula can't be evaluated the readout shows "Formula: —".

Formula	What it gives
X/Y	Ratio of the two channels (the same value as XY).
$100 * (X/Y - 1)$	Percentage by which the ratio differs from 1.
$X - Y$	Difference between the two channels.
X / I	Channel X divided by the current.

An example preset entry that uses a constant, for adding to `my_dcm2_formulas.txt` (the value is illustrative only):

```
[Normalised ratio]
formula = XY / R0
constants = R0=1:Ratio at the start of the test (use Capture from... XY)
```

No programmable analogue output:

Unlike the CGM-7's AUX output (Section 4.4), the DCM-2 has no programmable analogue output, so its Formula Output is a calculated and recorded channel only. Shared-hardware grouping (Section 6) is supported, same as CGM-7, including editing a grouped DCM-2 Setup's own fields (current, ranges, offsets, formula, ...) while it's *not* the active member – whatever's typed in is applied the next time this Setup is activated, same as the CGM-7 side.

5.7 PDsoft Assistant (DCM-2)

The DCM-2 counterpart to Section 4.6 – same entry point (the **Configure PDsoft Assistant** button and live status readout on this Setup's own header line), same overall idea, but a genuinely different check list suited to DC rather than a reworded copy of the CGM-7 one: DC has no phase/quadrature channel, so there's no 90° check and no phase-based sign check here.

DCPD shares the *same* underlying crack-closure fault as ACPD – crack faces intermittently touching and separating through the load cycle – it just shows up differently. AC catches it via a phase/sign shift; DC shows it as elevated signal noise as the crack chatters open and closed. This is why DC is almost always run with synchronisation (Section 5.5's Sync mode) – syncing the reading to a consistent point in the load cycle suppresses this noise; some users run Free Running anyway to avoid the cost of a sync module, knowingly accepting a noisier baseline as the tradeoff.

■ **Check for excess signal noise (crack-closure chatter, connections)** – the primary check here, not a secondary one the way it is on the CGM-7 side, since it's what actually catches DC's own version of the crack-closure fault. Once a short baseline is established, watches for a sustained rise in the active channel's own noise level above that baseline. Automatically widens its tolerance while this Setup's Sync mode (Section 5.5) is set to one of the three Free Running presets, since Free Running deliberately accepts a noisier baseline than a synced preset would – the same noise level that's a real finding on a synced Setup would otherwise be routine false-alarm spam on a Free Running one.

■ **Check signal strength against set current (connections, gain)** – the DC counterpart to the CGM-7 side's own current check, comparing the signal against a tunable expected V-per-A of set current.

■ **Check signal isn't too high at test start (headroom)** – a one-time glance at test start, same idea as CGM-7's own 0° headroom check.

■ **Check probe is responding at all (weak/disconnected signal)** – a simpler sanity check than CGM-7's phase-based sign check: is real current flowing but almost no signal coming back, the signature of a dead or disconnected probe.

The noise check finds are never a popup – a chart marker and an Activity log line only, same “never interrupt an unattended overnight test” reasoning as CGM-7's own Signal-change detector. The other three checks each log once, at test start, once the noise baseline has finished collecting.

v1, unvalidated against real DCM-2 hardware:

Unlike the CGM-7 side's Signal-change detector (ported from, and checked against, a real 19-hour fatigue test), no equivalent real DCPD dataset exists yet to validate these exact thresholds against - they're reasoned starting points, not measured constants. Treat a finding as a prompt to look, not a confirmed result, until this has been validated against real DCM-2 hardware.

6. SHARING HARDWARE BETWEEN SETUPS

A CGM-7 (or a DCM-2) can only be driven by one Setup at a time. If you try to connect a second Setup to a port that's already in use, PDsoft automatically links the two into a sequential group instead of failing with a busy error (shown once via an information notice, not asked every time). Works the same way for both units - a DCM-2 group and a CGM-7 group just can't mix, since they're never the same physical port.

- Only one member of a group is ever “active” (actually driving the port) at a time.
- Each grouped Setup gets an “Activate” button in place of Connect – switches which one is active, pushing that Setup's own settings to the hardware (for a DCM-2, this also restores whichever run state - Run or Resume - that Setup last had) and giving it its own settling time before its data is trusted.
- Only what actually differs is sent. Switching to a Setup sends just the settings that differ from what the previous active Setup left on the instrument – so if several Setups share the same current or frequency, it isn't set again and the CGM-7 doesn't hunt for it each time. A comms-error resend or a fresh connect still sends everything.
- Switching who's active while the outgoing Setup is recording is blocked – stop its recording first.
- Switching a grouped Setup's Unit dropdown to something else leaves the group cleanly first (disconnecting it, and dissolving the group entirely if only one member would be left).

Note:

This is exactly how round-robin recording across multiple grouped Setups works (Section 7.4) – it's the same activate/hand-off mechanism, just driven automatically instead of by clicking Activate yourself, and it covers DCM-2 groups the same way it always has CGM-7 ones.

Sharing also happens automatically at Record:

A Setup left disconnected, but with the same port selected as one already active elsewhere, joins that group the moment Record is clicked – there's no need to click Connect on it by hand first. The same one-time information notice above covers this too.

7. RECORDING A TEST

7.1 Data logging

Lives at the bottom of the Setup page, shared by every Setup:

- Working folder – chosen once (Section 2.3); every Setup's files land under here.
- Test title – used to name the output files for this session.
- Append – continue an existing file with this title instead of starting a new one.
- Resend all parameters after a comms error – if a unit loses power or drops the connection mid-test and comes back, this automatically resends every one of that Setup's parameters (CGM-7 or DCM-2), not just the one that failed.
- Save setup... / Load setup... – save or load every Setup's configuration at once, CGM-7 and DCM-2 fields alike, including each Setup's serial port and the test title. Loading a file also automatically connects every restored Setup to its saved port - no need to Connect each one by hand afterward; any that fails to connect (already in use elsewhere, unit switched off, ...) shows the same error a manual Connect would, for that Setup only.
- Silent mode (header, applies to the whole app) – suppresses advisory pop-ups (multiple-instrument reminders, shared-hardware notices, reset-plots/reset-cycle-count prompts, and the “can't switch active Setup right now” refusal when a sibling is recording or still mid-activation) for repeat use once you already know what every prompt is going to say. Genuine errors always still show.

Loading a setup file from another PC. Serial port names belong to one PC: a file saved on a colleague's machine may name COM5, which doesn't exist on yours, or is something else. When a file names ports this PC doesn't have, PDsoft asks once, before connecting anything, in a single “Ports from another PC” window:

- Each missing port is listed once, with the Setups that use it – e.g. “COM5 (Setups 1, 2, 3)” – so several Setups sharing one instrument need only one answer.
- For each, pick this PC's port from the list, or “Don't connect” to leave those Setups unconnected for now (connect them later by hand). PDsoft pre-selects this PC's unused ports as a starting guess – check them before clicking OK.
- Your choices apply to every Setup that used that port, then those Setups connect as normal.
- The ports you chose are saved into the setup file, so loading it again on this PC asks nothing. A port set to “Don't connect” keeps its original name in the file.
- Cancel loads nothing at all.

Tip:

If you're not sure which port is which instrument, the list shows each port's description; unplugging an instrument's USB lead and reopening Load setup... shows which entry disappears.

The working folder is handled the same way. If the file's working folder doesn't exist on this PC – saved on another PC, or on a drive that isn't plugged in – PDsoft asks once where to record:

- Keep my folder – this PC's current working folder (the default; offered only when this PC has one).
- Choose a folder... – pick any existing folder.
- Cancel – loads nothing at all.

Your choice is saved into the setup file, so loading it again on this PC asks nothing. A working folder that does exist on this PC is used without asking. Start recording never creates a working folder: it only makes the test and Setup folders inside one that exists, and otherwise stops with “Working folder not found” until you choose one.

A setup file from a newer PDsoft. If a file was saved by a newer build than the one on this PC, Load setup says so before loading anything, lists any settings this build doesn't know (they would be left out), and offers **Download update**, **Load anyway** or **Cancel**. A file saved in a newer format altogether isn't loaded until PDsoft is updated.

7.2 Starting and stopping

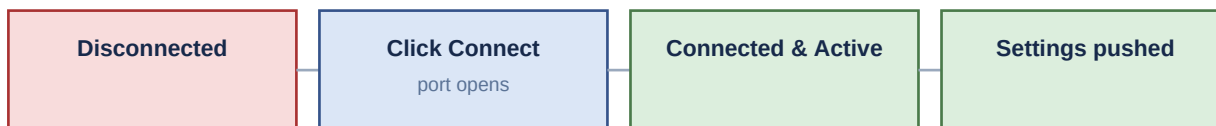
- Start recording – begins a round-robin recording pass across every eligible connected Setup, CGM-7 and DCM-2 alike.
- Stop now – aborts whatever Setup is mid-cycle immediately; no final row is logged for it.
- Finish all setups – lets every Setup in the round-robin finish its own cycle naturally before stopping, not just whichever one happens to be active right when you click it.

7.3 DCM-2: must be running before it can record

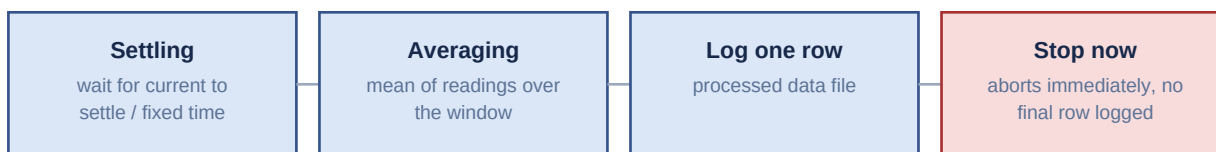
Since a DCM-2 gives no telemetry at all while stopped (Section 2.5), starting a recording session automatically sends Run (reset offset) to any connected-but-stopped DCM-2 Setup first - no confirmation prompt, clicking Start recording is already the confirmation. PDsoft also sends Stop automatically once a whole recording session actually ends (Stop now, or every Setup finishing via Finish all setups), not just for whichever Setup happens to be active at that moment.

7.4 How a recording session flows

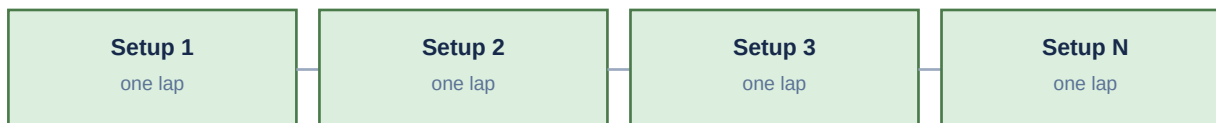
Recording is strictly one Setup at a time. Every connected Setup - CGM-7 or DCM-2, sharing a port or not - takes its turn in the same round-robin queue, and PDsoft never runs two Setups' laps together. Each turn is the same settle → average → log-one-row cycle:



1. Connecting (either unit) - if the port's already claimed by another Setup, PDsoft offers a shared-hardware group instead of a busy error.



2. One recording lap - repeats for as long as recording continues, for each Setup in turn. "Finish all setups" lets every Setup complete its current lap before stopping.



Only one Setup is ever working at a time; the queue then loops back to Setup 1. The single exception is a DCM-2 that is the only Setup recording – with nothing to take turns with, it simply keeps recording continuously rather than one row per turn.

While a lap runs, the recording status in both windows names the Setup and what it's doing: "Setting parameters...", "Starting..." (a DCM-2 being started), "Settling...", "Waiting for current to settle...", "Averaging...", then a steady green "Recording..." once a row is being logged. The busy phases are shown in orange and pulse slowly, so a slow instrument never looks as if PDsoft has stopped.

Mixed AC and DC sessions. When a recording session has at least one CGM-7 Setup and at least one DCM-2 Setup, PDsoft makes sure the two kinds are never energised together. Before each Setup's turn it makes the other kind safe: while a DCM-2 has its turn, every CGM-7 is set to 0 A (the CGM-7's built-in relay then disconnects its current); while a CGM-7 has its turn, every DCM-2 is sent Stop. When its turn comes round again the instrument is brought back – a DCM-2 resumes with its auto-offset kept (Resume, not Run), and a CGM-7 has its current set again. Your Set current values are never changed by this; a CGM-7 that is idle simply shows I OUT 0.0000 A, and its chart and the PDsoft Assistant pause until its turn. A current you type into an idle CGM-7 takes effect on its next turn. When the session ends every DCM-2 is stopped and every CGM-7 is given its current back.

Only in mixed sessions, and turn on Wait for current to settle:

A session with only CGM-7s, or only DCM-2s, is left exactly as it was – nothing is set to 0 A or stopped, because switching the current off and on at every turn would only slow the recording down. In a mixed session each CGM-7 turn starts with its current being switched back on, so keep “Wait for current to settle” (Section 4.2) ticked; PDsoft warns in the Activity log if it is off with no settling time. If PDsoft can't set the other instrument to its safe state, it doesn't switch this Setup on: its turn is skipped and tried again next lap, and the other Setups carry on.

7.5 Comms error handling (CGM-7 and DCM-2)

If a Setup loses comms mid-test, PDsoft holds the last known-good reading steady - current, X0/X90/Y0/Y90 (or X/Y/XY/L on DCM-2), the AUX formula value, all of it - rather than letting a corrupted or missing reading reach the chart and file. Every field stays frozen at its last real value, with fresh timestamps still advancing, for as long as the outage lasts: the trace holds a flat line instead of spiking or leaving a gap, and (if “Resend all parameters after a comms error” is on, Section 7.1) PDsoft keeps trying to recover the connection underneath at the same time. Works the same way on both units now - CGM-7 detects an outage the moment a poll attempt actually fails; DCM-2 has no equivalent (its telemetry is an unprompted background push, not something PDsoft asks for), so it instead watches how long it has been since the last reading arrived. A gap longer than three of the unit's own reading intervals – measured as the test runs, so a heavily filtered unit taking 15 s per reading gets about 45 s – counts as an outage, so one late or lost reading doesn't. Readings that come out identical to the one before (normal with heavy filtering and steady conditions) are real readings and are logged as such.

During a DCM-2 outage the held value is logged once per reading interval, as the readings themselves would have been. If the outage carries on, PDsoft reopens the serial port (at twice the outage wait, then again at four and six times), which sends nothing to the unit and leaves its settings and run state untouched; each attempt is noted in the Activity log.

Two notes mark the outage automatically, the same notes feature covered in Section 8.6 - so they show up everywhere a note does: the Activity log, a marker on the chart, and the data file's own “note” column (Section 9.3), including on PDsoft v3 Remote (Section 10.3).

- “Data lost - using last known value” - the moment the outage is first detected.
- “Data regained” - the moment a genuine reading comes back in.

Held rows are flagged in the file, not just visually

Every row logged during an outage - including in SETTLING DATA.csv/AVERAGED DATA.csv (or their DCM-2 equivalents) - has its “held_reading” column set to 1 (Section 9.1), so which rows are real vs. carried-forward placeholders stays clear even after the file is reopened somewhere else, long after the notes themselves might be easy to miss.

7.6 Recording never gives up

Once recording has started, PDsoft keeps going whatever goes wrong with an instrument or the data file – only Stop now or Finish all setups end it. What it does instead:

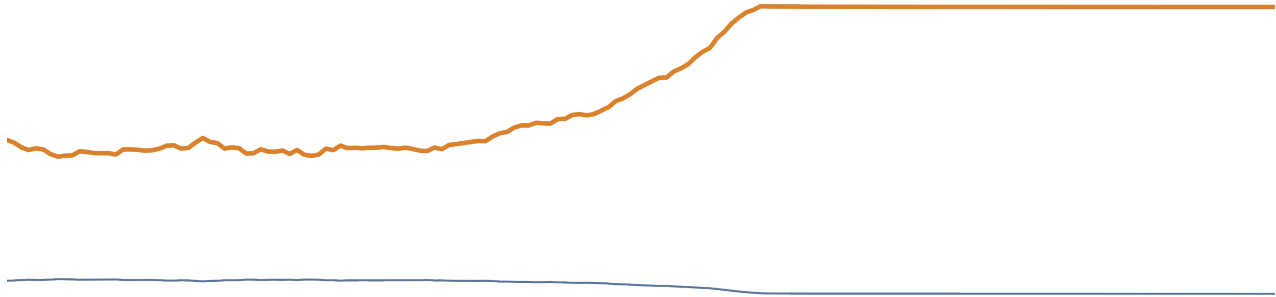
- A Setup whose turn can't go ahead – its settings can't be sent to the instrument (a DCM-2 gets three tries), its recording can't start, or in a mixed session the other instrument can't be made safe – has that turn skipped and is tried again next lap. The other Setups carry on. Its row shows “Turn skipped” and the reason is in the Activity log (and on PDsoft v3 Remote).
- A Setup whose settings didn't get through is always sent them again before it next records.
- A turn that runs far past its settling and averaging time (more than twice that, plus 15 minutes) is ended and the next Setup gets its turn; the unfinished part of that turn logs no row.
- If the chart can't be redrawn after a row (for instance while Dropbox briefly locks the data file), recording carries on and the chart catches up once the file can be read.
- If every Setup's turn fails (an instrument unplugged, say), PDsoft waits a minute between laps and carries on by itself once the instruments answer again.
- A row that can't be written to the data file (disk full, a network or Dropbox folder briefly unavailable, the file locked by another program) is kept and written, in order, with the next row that can be – never twice.
- Error messages still appear while recording, but never wait for a click, and only one per Setup at a time – every occurrence is in the Activity log.
- After three failed turns or rows in a row, a note marks it on the chart and in the data file, and is emailed if email notifications are on (whatever their note settings); another note follows when it clears.

At Start recording every DCM-2 is sent all of its Setup's settings – scanner channels, ranges, current and the rest – whatever it was left on, so the first readings are always taken on the right channel. A running DCM-2 only answers between readings, so a full set of settings (at Start recording, Load setup, or a resend after a comms error) is sent with the unit briefly stopped and then resumed with its auto-offset kept: about 20 seconds instead of several minutes with a heavy filter.

Starting is different: Start recording still refuses, with a message, if the working folder is missing or no Setup is connected, while you're there to fix it.

8. THE DATA & PLOT WINDOW

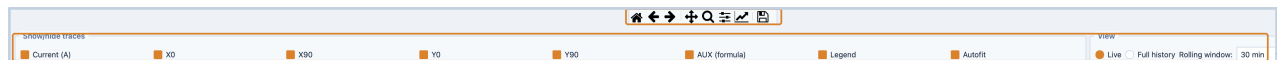
Shows live readings as they're recorded, and lets you review a test's full history, add notes, and open old data files. The Recording controls here mirror the Setup page's – you can start or stop a recording session from whichever window is in front.



A real ACPD crack-growth test: the active channel (orange) climbs as the crack initiates and grows, then settles once it stabilises, while the reference channel (grey) stays essentially flat throughout – this is what a healthy, working test looks like on the chart.

8.1 Viewing a single Setup

The “Viewing” dropdown at the top picks which Setup's chart is shown. The controls underneath the chart - highlighted below - split into three groups: the toolbar, “Show/hide traces”, and “View”.



The chart toolbar and the Show/hide traces & View controls beneath it.

The toolbar (left to right in the screenshot above) is matplotlib's own pan/zoom control set - the same eight tools on every PDsoft chart, CGM-7 or DCM-2, Setup or All Setups:

- **Home** – resets the view back to showing all the data, undoing any zoom or pan.
- **Back / Forward** – step through your last few zoom/pan positions, like a browser's history - useful for returning to a view you had a moment ago without re-drawing it by hand.
- **Pan** – click it, then click-and-drag anywhere on the chart to slide the view around once you're zoomed in. Scrolling while Pan is active zooms in/out around the cursor.
- **Zoom** – click it, then drag a rectangle around the region you want to zoom into. Both Pan and Zoom automatically switch Autofit off when clicked (see the note below).
- **Configure subplots** (the sliders icon) – adjusts the chart's own internal margins and spacing. PDsoft's charts are always a single plot, so this rarely does anything useful here - it's a standard matplotlib tool included for completeness, not something a PDsoft test normally needs.
- **Edit axis, curve, and image parameters** (the line-with-pencil icon) – opens a dialog for directly editing axis ranges/labels/scale and each trace's own line style, color, and label. Anything changed

here is undone the next time the chart redraws (e.g. on the next live reading), so it's only useful for a one-off look at the data, not a lasting change - use Show/hide traces and Autofit/View (below) for anything you want to stick.

■ **Save** (the floppy-disk icon) – exports exactly what's currently on screen as an image file (PNG, PDF, SVG, and a few others) to wherever you choose - handy for dropping a chart straight into a report without a separate screenshot tool.

Each checkbox in Show/hide traces toggles one trace on the chart. The Legend checkbox, next to them for both units, shows or hides the chart's legend, and stays as you set it when you switch a Setup between CGM-7 and DCM-2. Autofit keeps the view automatically scaled to fit whatever data is on screen; View switches between Live (a rolling window as a test runs), Full history (everything recorded so far), and a specific Rolling window duration.

Zoom/Pan and Autofit don't mix:

Clicking Zoom or Pan automatically switches Autofit off - the two are mutually exclusive, since Autofit's whole job is to keep rescaling the view, which would immediately undo any manual zoom you just made. Click Home on the toolbar (or re-tick Autofit) to go back to an automatically-scaled view.

8.2 Traces by unit

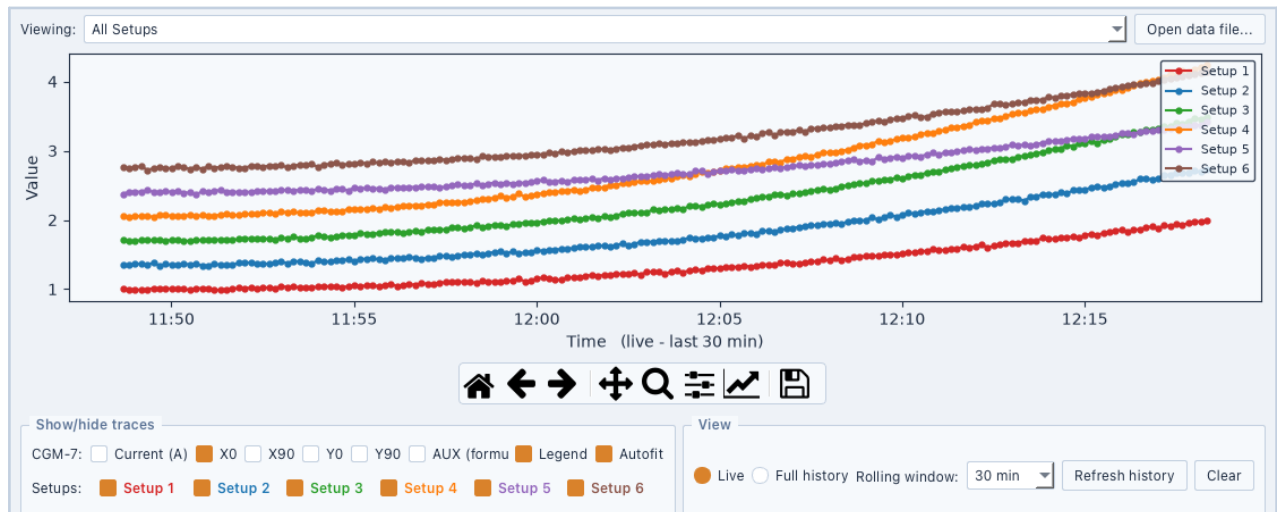
Unit	Selectable traces
CGM-7	Current (A), X0, X90, Y0, Y90, AUX (formula)
DCM-2	Current (A), X, Y, X/Y, Load, Formula

8.3 “DCM-2 is not running” notice

When a DCM-2 Setup is connected but stopped, its chart shows an explanatory overlay instead of sitting empty with no explanation – it clears the instant Run or Resume is pressed.

8.4 Viewing all Setups together

Choose “All Setups” from the Viewing dropdown to compare several Setups on one chart, CGM-7 and DCM-2 alike. “Show/hide traces” has its own CGM-7 row and DCM-2 row of trace checkboxes (Section 8.2) - each checked Setup pulls from whichever row matches its own Unit. A unit's row only appears while at least one current Setup actually uses that unit, so an all-CGM-7 session doesn't show an empty DCM-2 row (or vice versa). The Setups row of checkboxes picks which Setups to include.

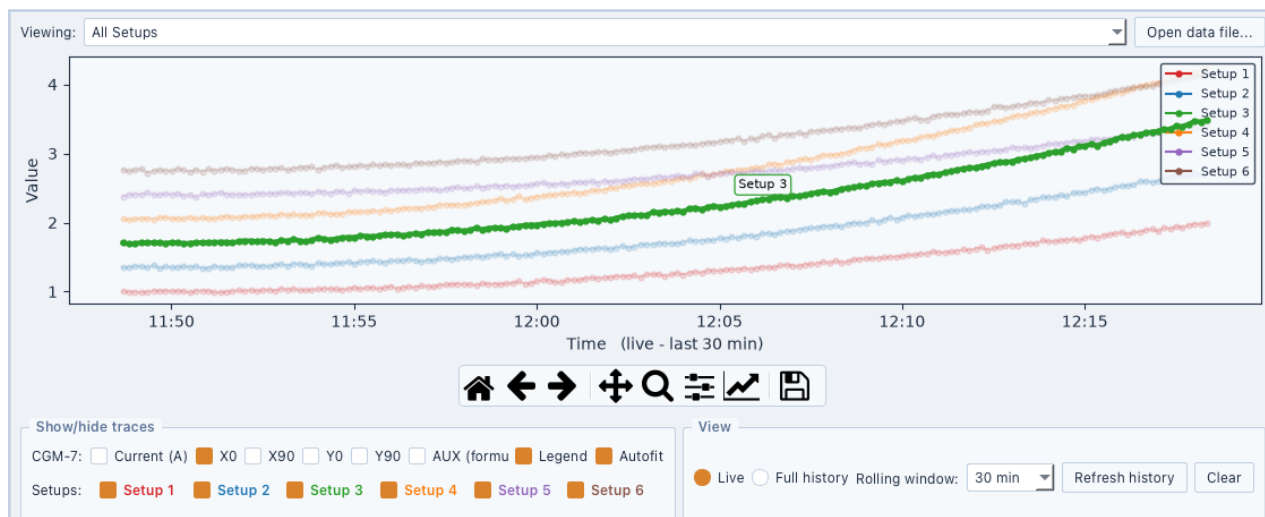


All Setups view with one trace (X0) ticked: six Setups, each drawn in its own colour - the same colour as its checkbox name beneath the chart.

Telling the Setups apart. With one trace ticked (the usual way to compare Setups), every Setup gets its own colour, and the Setup's name under the chart is printed in that same colour, so you can match a line to its Setup at a glance. The legend then has just one entry per Setup.

Names come from the specimen description. Once you've typed something into a Setup's “Specimen name/description” field (Section 3), that text is used as its name here – on the legend and on its checkbox – instead of the plain “Setup N”. Leave it blank and the Setup keeps “Setup N”. A long description is shortened with “...” to fit; hover the checkbox, or the line itself (below), to see it in full. If two Setups are given the exact same description, PDsoft tells them apart by adding “(Setup N)” after each one's name.

Hover to pick one out - and see its full name. Rest the pointer on a line – or on its name in the legend – and that Setup's line is thickened, while every other line fades back and a label appears at the cursor spelling out that Setup's full specimen description, even where the legend/checkbox itself had to shorten it. Move away and the chart returns to normal. It only changes how the chart is drawn; nothing in the data is altered.



The pointer resting on Setup 3's line: it's emphasised and named, and the other five fade back.

Several traces at once. If more than one trace is ticked, colour identifies the trace instead (e.g. X0 is always the same blue, everywhere) and each Setup gets its own line style (solid, dashed, dotted, ...), with the legend naming both. Hover highlighting works the same way.

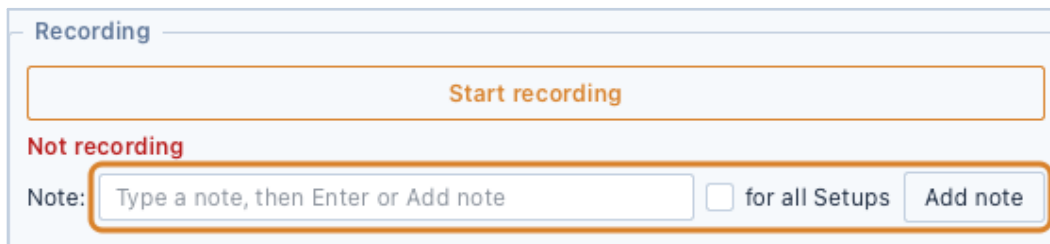
A big legend never squashes the chart. With many Setups the legend spreads over several columns and sits over the top-right of the chart rather than shrinking it; untick Legend if it is in the way of the data. Any notes attached to a Setup (Section 8.6) appear here too, colour-matched to that Setup's own line.

8.5 Live vs. Full history

- **Live** – shows a rolling window of the most recent readings (choose 5–120 minutes).
- **Full history** – reloads and shows every point recorded this session, from disk. The chart switches to it by itself once recording starts, so it always shows the whole test.
- **Refresh history** – re-reads the data files (useful if you've switched away and back).
- The time axis shows the time of day each reading was taken – just the time for a test under 24 hours, with the day added once it runs longer. Under the axis: when the data starts and how long it covers (e.g. “from Sun 11 Oct 16:26, 16.7 h”), or “live - last 30 min” in Live. In All Setups every Setup shares the same time axis, so Setups taking turns line up as they really happened.
- Each logged reading is marked with a dot while there are few enough to tell apart, so a long settle and average shows as dots several minutes apart rather than as a misleadingly smooth line. While a Setup settles and averages, its status line says when its next reading is due (“next reading at 09:07”).
- **Clear** – wipes the current chart, including any notes drawn on it (asked for automatically when you start a new recording session, so old traces don't linger).

8.6 Adding notes

The “Note:” field and “Add note” button, in the Recording box of the Data & Plot window, let you jot a free-text note at any point during a test – a reminder of what just happened, an observation, anything worth tying to a specific moment in the data. It works from wherever you happen to be, including while viewing “All Setups” (Section 8.4) – you don't need to switch to a specific Setup's own page first.



The Note field and Add note button, in the Recording box.

Type the note and press Enter (or click “Add note”). A note belongs to **one Setup**: the Setup recording now – the one whose turn it is. If nothing is recording, it goes to the Setup you're viewing (or, in All Setups view, only to the Activity log). Tick “**for all Setups**” beside the field to send it to every Setup instead; the box unticks itself once the note is added, so the next note goes back to just the Setup recording now.

A note lands in three places:

- Activity log – one line naming where it went, e.g. “Note (Setup 2): sample cracked visibly”.
- The data file – that Setup's own processed CSV, in its “note” column (see Section 9.3) – the most important of the three, since it's what survives after the software is closed. A Setup that isn't recording at that moment (e.g. waiting its turn) gets the note on the first row of its next turn.
- The chart – a small vertical marker with the note's text, on that Setup's own chart and on the combined “All Setups” chart – only that Setup's, so with many Setups you can always tell where something happened.

8.7 Opening an old or arbitrary data file

The “Open data file...” button, next to the “Viewing” dropdown, lets you browse to and view any PDsoft log CSV as a full-history chart – an old test from months ago, or one copied in from another PC – without needing to reconnect hardware or recreate a matching Setup first.

- Format (CGM-7 or DCM-2) is detected automatically from the file itself.
- Trace checkboxes, colors, and the chart itself match what you already know from the rest of the app.
- “Open...” inside that window lets you pick another file without closing it first; “Refresh” re-reads the current file from disk.



A real recorded file, opened and shown in the standalone file viewer.

A file with no readable data rows yet

– for example, a recording that was started and stopped again before its first row logged – opens with a clear “No data” message rather than a silently blank chart.

9. OUTPUT FILES

Activity log. Every recording session also writes one file in the root of the working folder, named after the test title and the time recording started, e.g. `Natalie test folder 2026-10-12 093000 ACTIVITY LOG.txt`. It holds every Activity log line from every Setup – CGM-7 and DCM-2 – each tagged with its Setup and time, written as it happens, from Start recording until the next Start recording, so what happened around a stop is in it too. It is the place to look when a test didn't run as expected, and the file to send to Matelect.

9.1 CGM-7

Every Setup writes its own files under `working_folder/test_title/Setup label/` – "Setup label" is "Setup 1", "Setup 2", etc., with that Setup's own title (Section 3) appended if one's set, e.g. "Setup 1 - Bracket A". Three files per recording session: `PROCESSED DATA.csv` (one row per completed settle+average cycle – what the charts and the All Setups view read from), `SETTLING DATA.csv / AVERAGED DATA.csv` (every raw reading taken during those phases), and `EVENT LOG.txt` (a timestamped log of everything that happened). Each CSV's own opening lines record the test title and the CGM-7's serial number (if it was connected when the file was first created), e.g. `# Serial: 12345` - safely ignored by PDsoft's own reload and any spreadsheet program, same "#" -comment convention as the title line above it.

Column	Meaning
<code>timestamp_iso / unix_time</code>	When this row was logged.
<code>cycle_count</code>	Load Sync mechanical cycle count, if enabled.
<code>load_signal_V</code>	Load signal value at the sync point, if Load Sync is enabled.
<code>current_A</code>	Measured excitation current.
<code>x0 / x90 / y0 / y90</code>	Channel X/Y readings at 0°/90°.
<code>overload_x / overload_y / current_compliance</code>	Hardware status flags from the CGM-7.
<code>current_setpoint_A,</code> <code>frequency_setpoint_Hz, gain_x/y,</code> <code>filter_x/y, offset_*</code>	The settings this row was recorded under.
<code>signal_scanner_channel /</code> <code>current_scanner_channel</code>	Scanner channels this row was recorded under.

Column	Meaning
aux_value	The AUX Output formula's calculated value (Section 4.4), recorded regardless of whether the physical output is enabled. The column header itself now shows the live formula too, e.g. "aux_value (x0/y0)", so it's readable straight from the file without opening PDsoft.
note	Blank on almost every row - populated only on the row logged right after a note was added (Section 8.6), with multiple notes before that row concatenated with "; ".
held_reading	1 if this row is a carried-forward placeholder logged during a comms outage (Section 7.5), 0 for a genuine reading. Present in SETTLING DATA.csv/AVERAGED DATA.csv too, not just PROCESSED DATA.csv.

9.2 DCM-2

Same folder structure and file roles as CGM-7 (PROCESSED DATA.csv, SETTLING DATA.csv, AVERAGED DATA.csv; its Activity log lines are in the session's ACTIVITY LOG.txt above), under that Setup's own subfolder - including the same opening title/serial-number lines, this time the DCM-2's own serial number. The columns are laid out like the CGM-7's: scanner channels and current setpoint first, then the readings, then the settings the row was recorded under, with the timestamps and note at the end. As on the CGM-7, the settings columns appear only in PROCESSED DATA.csv, and they are read afresh for every row, so a setting changed during a recording shows up from the next row on. SETTLING DATA.csv and AVERAGED DATA.csv hold just the readings, held_reading and the timestamps.

Column	Meaning
signal_scanner_channel / current_scanner_channel	Scanner channels this row was recorded under (the voltage scanner and the current scanner).
current_setpoint_A	The current setpoint this row was recorded under.
current_A	Measured excitation current.
x / y	Channel X/Y readings.
xy_ratio	X/Y.
I	The load reading from the DCM-2's own built-in load sync.
aux_value	The DCM-2 Formula Output's calculated value (Section 5.6) - same live-formula column header as CGM-7's, e.g. "aux_value (I)".

Column	Meaning
range_x / range_y	The voltage range set for each channel, as the unit names it, e.g. 450uV (Section 5.4).
filter_readings / filter_samples	The filter's readings and samples settings (Section 5.5).
settling_ms / mark_space_ms	The current settling time and Mark/space delay, in milliseconds (Section 5.2).
offset_x_uV / offset_y_uV	The channel offsets, in microvolts (Section 5.4).
sync_mode	The Sync mode selected (Section 5.5), by name.
load_pkpk_V / load_offset_V	The Load Pk-Pk and Load offset settings (Section 5.5).
held_reading	Same "held_reading" column as CGM-7's (Section 9.1 / 7.5) - 1 for a carried-forward placeholder logged during a comms outage, 0 for a genuine reading. Present in the DCM-2 SETTLING/AVERAGED files too, not just the main processed one.
temp_fets_C / temp_psu_C / temp_c_C / temp_d_C	The DCM-2's four internal temperatures in °C (output FETs, power supply, and sensors C and D, as the unit itself names them), averaged over the row like the other readings. Also in the SETTLING/AVERAGED files, one value per reading.
timestamp_iso / unix_time	When this row was logged.
note	Same "note" column as CGM-7's (Section 9.1) - blank except on the row logged right after a note was added.

Adding to an existing DCM-2 file:

If you record into a DCM-2 file that already exists (the Append option, Section 7.1), new rows follow that file's own column layout, so a file started under a different PDsoft build is never left with columns that don't match its header. Settings columns the older layout doesn't have are simply not written to it.

9.3 Notes in the data file

A note added while a Setup is recording (Section 8.6) is written into that Setup's own PROCESSED DATA.csv as its own “note” column, blank except on whichever row was logged right after the note was added:

...	aux_value	note
...	0.5502	
...	0.5498	bumped the load slightly
...	0.5511	

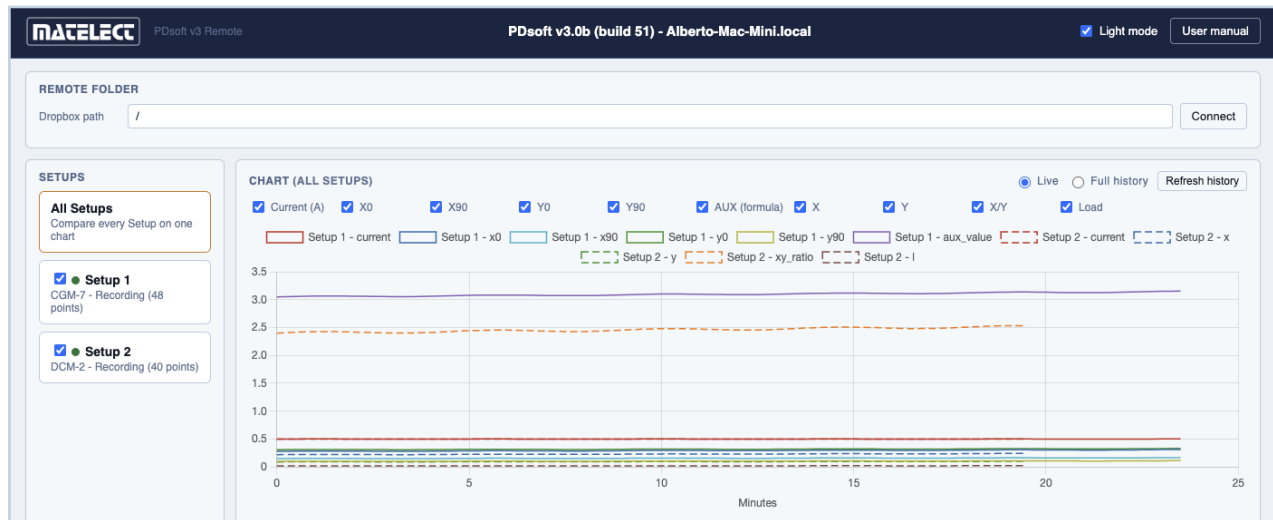
A note can only ever attach to the very next row logged, not to an exact instant in between two rows - if a second note arrives before that next row is logged, the two are concatenated into the same cell with “; ” between them rather than the first one being silently dropped. This is a real column with one fixed position (opens cleanly in Excel or any CSV tool, unlike the file's own comment-style title line), not something a spreadsheet needs to skip or parse specially.

A file from a much older PDsoft version may have no note column at all:

Such a file recorded a note as a separate “# NOTE @ ...” comment line instead. It still loads correctly in PDsoft; that comment line just won't show up as a note here, since it never had a dedicated column to begin with.

10. REMOTE CONTROL – PDSOFT V3 REMOTE

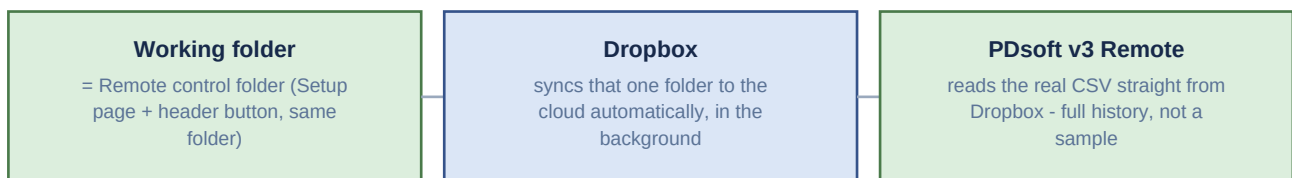
PDsoft v3 Remote is a web page - anywhere, on your phone, another computer, or handed to a colleague or customer - that views and controls this running PDsoft instance, using your Dropbox as the entire communication channel. There is no direct network connection between the web page and this computer: PDsoft only ever reads and writes plain files in one local folder, and Dropbox's own sync engine carries them to and from the cloud.



PDsoft v3 Remote's All Setups view - two Setups' full history overlaid on one chart, each with its own line-dash pattern.

10.1 Record everything to one cloud folder

The recommended setup is simple: **point your Working folder (Section 2.3) at the same folder as PDsoft's Remote Control dialog.** Do that, and your real recorded data (PROCESSED DATA.csv and friends) syncs to Dropbox automatically, right alongside the small control-channel files PDsoft v3 Remote already reads - so it can show your **actual, complete, undecimated** data, not a derived copy or a rolling sample.



One folder, doing both jobs at once. PDsoft itself never talks to Dropbox directly - the Dropbox desktop app on this computer is what makes the folder exist in the cloud at all.

If you'd rather keep the two folders separate:

You can still enable Remote Control with a different folder to your Working folder - live viewing and every remote command still work exactly the same. The only thing you lose is full-history access: PDsoft v3 Remote will only ever see the live rolling window (Section 10.4), and says so plainly rather than guessing at data it can't reach. PDsoft's own Remote Control dialog shows a live warning whenever the two folders don't match, so you'll know immediately if this applies to you.

Recording at full speed inside a Dropbox-synced folder:

If you record with no settling/averaging wait (a new row roughly every real reading - about 3/second for a DCM-2 at its factory-default filter settings) **and** your Working folder is inside a Dropbox-synced folder, PDsoft v3 Remote's full-history view can lag noticeably behind for the whole recording session. This isn't a fault in the recording itself - your local data stays complete and correct throughout - it's Dropbox's own uploader choosing to batch a rapidly-changing file rather than sync every single write, only catching up once recording slows down or stops. PDsoft's Activity log notes this the first time it applies to a Setup. If you want the full-history view to stay closer to real-time during the test itself, tick "Wait for current to settle" or set a non-zero settling/averaging time.

10.2 One-time setup

PDsoft v3 Remote is already online at <https://www.matelect.com/remote/> - you don't need to install or host anything yourself. Just:

- **1. Make sure Dropbox is installed on this computer**, signed into your own Dropbox account (a free account is enough - get one at dropbox.com if you don't have one already).
- **2. Open <https://www.matelect.com/remote/>** and click "Log in with Dropbox". The first time you do this, Dropbox automatically creates a dedicated folder for PDsoft inside your own Dropbox.
- **3. Give Dropbox a moment to sync that new folder down** to this computer - it typically appears within a few seconds at `~/Library/CloudStorage/Dropbox/Apps/PDsoft v3` on a Mac (or the equivalent path under your Dropbox folder on Windows).
- **4. In PDsoft:** header → Remote control → Browse to that folder → list every email allowed to issue commands → Enable. This also force-enables Silent mode, so a remote command never sits waiting on a dialog nobody's there to click.
- **5. In PDsoft: set your Working folder** (Setup page, Data logging box) to that exact same folder, or a subfolder of it - this is what gives PDsoft v3 Remote full-history access (Section 10.1). Skip this step if you'd rather keep the folders separate (see the note above).
- **6. Back at <https://www.matelect.com/remote/>**, leave "Remote folder" as "/", click Connect.

10.3 Using it day to day

Once connected, PDsoft v3 Remote mirrors most of what the Data & Plot window shows:

- **Setups list** – every current Setup, its connection/recording state, plus an “All Setups” card that overlays every ticked Setup's traces on one chart (each Setup gets its own line-dash pattern - see the screenshot above).
- **Live / Full history toggle** – Live shows the same rolling window as the desktop app. Full history downloads and reads the real PROCESSED DATA.csv directly (Section 10.4) - only when Working folder is set up per Section 10.1; otherwise the page says so rather than guessing. Auto-updates as the file grows: every poll cheaply checks whether the file has actually changed and only re-downloads it when it has, so you don't need to click “Refresh” by hand to see new data (that button still works too, for an immediate check). If the file can't be read the first time (Dropbox still syncing it), the page keeps trying every few seconds until it can.
- **Recording controls** – Start recording / Stop now / Finish all setups / Add note (with the same “for all Setups” box), same meaning and same look as Sections 7.2 and 8.6. In All Setups view this is the only control panel shown – Set a field, Formula, Connection and the rest appear once you pick a single Setup, so a change always has an obvious target: only Start recording shows while nothing's recording; once something is, it's replaced by Stop now and Finish all setups, with a “Recording” label next to them, matching the desktop app's own behavior rather than only showing in the Activity log. A note added from either side shows the same orange marker on the chart here too (Live and Full history alike), not just in the Activity log.
- **Set a field** – changes one whitelisted setting on one Setup at a time (current, frequency, gains, filters, offsets, formulas, settling/averaging, and more). The Value control matches the field: a checkbox for an on/off setting, a dropdown of the exact valid choices for one with a fixed set of options (Gain, Filter, DCM-2 Run mode, ...), or a plain text box for everything else - no guessing what to type. Deliberately excludes anything that could break a live connection outright, such as the DCM-2's RS232 mode.
- **Formula** – the same box PDsoft itself types a formula into (Section 4.4 for a CGM-7, Section 5.6 for a DCM-2), for whichever Setup is selected. Shows the formula in use right now with any constants it has values for, and, for a CGM-7, whether AUX output is enabled and its limits. Offers that unit's whole Preset list – picking one fills in the formula and its constants' default values, exactly like the popup PDsoft shows locally – and a value box appears for every name the formula needs, including one you type in yourself. Edit, then **Apply**; tick **for all CGM-7 Setups** (or DCM-2) first to send the same formula and constants to every Setup of that unit – the box unticks itself afterwards. **Revert** puts back whatever PDsoft has. A formula is worked out inside PDsoft rather than sent to the instrument, so a change applies straight away, even to a Setup that's waiting its turn (Section 6). Obvious slips (^ instead of **, a percent sign, a bracket that doesn't close, a constant left blank) are caught here and explained, rather than only showing as a message on the PC where you can't see it.
- **Save preset / Delete** – in the same panel: adds what you've typed to your own preset file on the PC, or updates one of your presets in place, with no restart needed at either end (Section 4.4). PDsoft checks the formula first and refuses it with a reason if it won't work. Your own presets are marked “(yours)” in the list and are the only ones that can be changed or deleted; PDsoft's built-in

presets are left alone.

■ **Connect / Disconnect** – one Setup at a time; the port name must be typed in exactly as PDsoft shows it locally.

■ **DCM-2 Run Control** – Run (reset offset) / Resume (keep offset) / Stop, shown only when the selected Setup is a DCM-2 (same buttons as Section 5.2's Excitation box). Disabled while that Setup isn't connected, and shows the same "Stopped - no live data" wording the desktop app's own chart overlay uses (Section 8.3) whenever the unit isn't currently running.

■ **PDsoft Assistant** – works for both CGM-7 (Section 4.6) and DCM-2 (Section 5.7) Setups. Commissioning which checks run – and, for CGM-7, Signal-change detection's own active channel/expected direction – can only ever happen locally, since it needs the Configure dialog PDsoft shows – a Setup that hasn't been configured yet shows a disabled button with an explanatory message instead. Once configured, toggling it here is identical to clicking the button in PDsoft itself, and any finding shows up the same way – a chart marker, an Activity log line, and the data file's own note column.

■ **Trace show/hide checkboxes** – above the chart, one per plottable field for whichever unit(s) the current view involves (Section 8.2's own list) - same idea as the desktop app's Show/hide traces. Each Setup's chart, and All Setups, keeps its own ticks, remembered by your browser.

■ **Light/dark theme toggle** – matches the desktop app's own palette.

■ **User manual button** – header, opens this manual in a new tab, same document the desktop app's own User manual button opens.

10.4 What actually gets published, and how often

File	Written	Contents
instance.json	once, at startup	Which PDsoft instance this is (version, build, hostname).
status.json	every ~2 seconds	Every Setup's connection/recording state, settings, current formula, the formula preset list, and where its real CSV lives (see below).
live/<label>.json	every ~2 seconds	The most recent ~300 readings for that Setup - the same rolling window the desktop app's Live mode uses.
commands/inbox & commands/processed	as commands are issued/handled	The command queue - every action you take on the web page (Start recording, Set a field, ...) lands here as a small file, which PDsoft picks up on its next poll.

Full history has no file of its own - PDsoft v3 Remote instead reads which Setup's real CSV is reachable (only possible once Working folder is set up per Section 10.1) and downloads that file directly from Dropbox - complete, exactly as recorded, nothing decimated or derived.

10.5 Security – what this actually protects

There is no PDsoft-side login system. The real access boundary is who you've shared the Dropbox folder with – if someone can write files into commands/inbox, they can issue commands, full stop. Two layers sit on top of that:

- **Dropbox OAuth in the browser** – each person authenticates as themselves against Dropbox, not a shared password. Their authenticated email is stamped into every command they issue.
- **The allowed-emails list** (entered in PDsoft's Remote Control dialog, Section 10.2 step 4) – checked against that email before executing anything. This is a convenience/intent layer, **not** a strong security boundary on its own, since the email is self-reported by the browser, not cryptographically verified. If this list is empty, PDsoft refuses to execute any remote command at all (fails closed) rather than silently trusting everyone with folder access.

Enabling Remote control also force-enables Silent mode app-wide (Section 7.1) – a remote command must never sit waiting on a dialog nobody's there to click. And since your real data now lives inside the same Dropbox folder as the control channel (Section 10.1), the same folder-sharing boundary now covers your recorded data too - share the folder as carefully as you would the data itself.

11. EMAIL NOTIFICATIONS

Emails notes and/or PDsoft Assistant findings to a list of addresses you choose - useful for an unattended overnight test, so a problem doesn't sit unseen until someone next checks the app. **Email notifications**, a button in the header of either window, opens the dialog that configures this.

Batched, not one email per note:

Several notes/findings arriving close together (e.g. PDsoft Assistant flagging noise, a current mismatch, and a weak signal all off the same bad reading) go out as **one** email listing all of them, not several separate ones - the "Batch window" setting below controls how long PDsoft waits after the first one before sending.

11.1 One-time setup (an email account you already have)

PDsoft sends email through a normal email account - Gmail, Outlook/Office365, iCloud, a work mailbox, whatever you already use - via SMTP, the standard protocol any email client uses to send mail. **There is no third-party service to sign up for and nothing to pay for.**

You'll need an "app password", not your normal login password:

Most providers refuse a program logging in with your everyday password and require a separate app-specific password instead, generated once in your account's security settings (this usually requires two-factor authentication to be turned on first, if it isn't already):

Gmail - myaccount.google.com/apppasswords (needs 2-Step Verification enabled first).

Outlook/Office365 - account.microsoft.com/security → Advanced security options → App passwords.

iCloud - appleid.apple.com → Sign-In and Security → App-Specific Passwords (needs two-factor authentication on the Apple ID).

Use the generated app password in PDsoft's Password field below, not your real one.

- **1. Generate an app password** for whichever email account you want PDsoft to send from - see the note above for where to find this on the major providers; a work mailbox's own IT setup may call this something slightly different, or may not require it at all.
- **2. In PDsoft:** header → Email notifications → fill in the mail server/port, your email address as the username, and the app password, list who should receive these emails, tick Enabled, Save.

11.2 Configuring PDsoft

- **Enabled** – the master switch; nothing is sent while this is off.
- **Mail server (SMTP host) / Port** – Gmail: *smtp.gmail.com*, port 587. Outlook/Office365: *smtp.office365.com*, port 587. iCloud: *smtp.mail.me.com*, port 587. A work mailbox's IT department will have its own server address.
- **Username** – usually your full email address.
- **Password** – the app-specific password from Section 11.1, not your normal login password.
- **From address** – leave blank to send as the username above (the normal case); only fill this in if your account is set up to send as a different address than you log in with.
- **Send to** – one email address per line; every address here gets every email.
- **PDsoft Assistant findings / All other notes** – two independent checkboxes, so you can choose PDsoft Assistant's own findings only, manually-typed notes and system status notes ("Data lost"/"Data regained") only, both, or neither.
- **Batch window (seconds)** – how long PDsoft waits after the first note in a batch before sending (5-3600, default 60) - see the note above.
- **Send test email** – sends one immediately using whatever's currently typed in the dialog (no need to Save first) - confirms the mail server/username/password/recipients all actually work before trusting this live.

Credentials stay on this machine:

The app password and recipient list are saved to this computer only, the same way Remote Control's own settings are - never inside a "Save setup" file, which is meant to be shared/loaded across machines.

12. INTERFACE BASICS

- Light mode / Dark mode – checkbox in the header of either window; applies everywhere at once.
- Silent mode – checkbox in the header; see Section 7.1 for exactly what it suppresses.
- Remote control – button in the header; opens the dialog that configures PDsoft v3 Remote access (Section 10.2).
- Email notifications – button in the header; opens the dialog that configures email alerts for notes/PDsoft Assistant findings (Section 11).
- Remove – on each Setup row; see Section 3.
- Activity log – a running, timestamped log of everything happening, visible on both the Setup page and the Data & Plot window.
- Logo – click it to open matelect.com.
- User manual button – opens this manual.
- Closing a window – closing either the Test Setup window or the Data & Plot window closes PDsoft, so there's never a window left behind. If a recording is running, PDsoft asks first (“Stop it and close PDsoft?”, even in Silent mode); answering Yes stops the recording properly, including sending Stop to a running DCM-2, and answering No leaves both windows open. A running DCM-2 only answers Stop once it has finished its current reading, so PDsoft shows “Stopping the DCM-2 – it finishes its current reading first” for up to one reading (about 15 s with a heavy filter) before closing, to be sure the unit really has stopped. Several Setups sharing one DCM-2 send it a single Stop.

13. TROUBLESHOOTING

“Waiting for current to settle...” never finishes (CGM-7)

Adaptive settling gives up after 60 seconds and proceeds anyway if the current reading never gets near the setpoint, logging what happened to the activity log and event log. If this keeps happening, check the CGM-7 is actually able to reach that current with what's connected to it – if the reading is rock-steady at a value that never moves at all despite the setpoint changing, that points to the unit itself (or its connection to the specimen), not a software setting.

“This CGM-7 can't reach ... A with what's connected to it”

The current you set (Section 4.2) is within PDsoft's own allowed range, but this particular CGM-7/probe still can't actually deliver it – a real, physical limit (probe impedance, the gain range in use, ...), not a comms problem. PDsoft shows this once, as a plain message, then keeps recording/plotting normally using whatever current the unit is actually managing to deliver - it isn't held or hidden. Try a lower value, or check the gain range for the channel in use; the message clears itself the moment a deliverable current is set.

A Setup won't Activate (CGM-7)

You can't switch which grouped Setup is active while the outgoing one is still recording – stop its recording first, then Activate the other Setup.

The DCM-2 chart is empty

Check the DCM-2 Excitation box (Section 5.2): the unit produces no telemetry at all until Run or Resume has been pressed since it was last connected. The chart itself explains this with an on-screen notice (Section 8.3) rather than sitting empty with no explanation.

An opened data file's chart is empty

Opened via “Open data file...” (Section 8.7): a “No data” message means the file itself has no readable rows yet (e.g. a recording stopped before its first row logged), not a problem with PDsoft.

Comms errors mid-test

Turn on “Resend all parameters after a comms error” (Section 7.1) so a dropped connection automatically resends every parameter once it reconnects, rather than leaving the unit on whatever it reset to.

Occasional isolated “Data lost” notes on Windows:

A single, brief reading occasionally missed here and there is a known characteristic of the Silicon Labs CP210x USB-to-UART driver on Windows, not a fault in the CGM-7 or in PDsoft - macOS's own serial driver rarely does this. PDsoft already retries a failed reading a couple of times before treating it as a real comms error, so only a genuinely sustained problem is ever reported. If it still happens often enough to matter, the usual Windows-side fix is lowering the port's Receive/Transmit buffer sizes in Device Manager (Port → Properties → Port Settings → Advanced) - and, on drivers that expose it, also lowering the Latency Timer.

DCM-2 outages. PDsoft keeps a record of everything sent to and received from each DCM-2 port, with times to the millisecond, in a file named `dcm2_raw_<port>.log` in the logs folder next to your formula preset files (on a Mac `~/Library/Application Support/Matelect/PDsoftv3/logs`, on Windows `%APPDATA%\Matelect\PDsoftv3\logs`). If a DCM-2 outage keeps happening, send that file to Matelect with the time of the “Data lost” note – it shows whether the unit stopped sending, sent something unreadable, or the connection stalled. Each file holds about 5 MB (the previous 5 MB is kept as `.log.1`).

Remote control: “Couldn't read instance.json”

Check in PDsoft that Remote control is Enabled (header → Remote control), and that the folder it's pointed at is the same one PDsoft v3 Remote is reading (its “Remote folder” field should be `/`). If it was working before and stopped, Dropbox itself may just need a moment to finish syncing - wait a few seconds and click Connect again.

PDsoft v3 Remote says “no full history available”

Working folder (Setup page) isn't set to the same folder as Remote Control (or a subfolder of it) - see Section 10.1. PDsoft's own Remote Control dialog shows a live warning whenever these two don't match, so check there first. Live viewing and remote commands still work fully either way; only full history needs the two folders to line up.

Email notifications: “Send test email” shows an error

The error text names exactly what's missing/wrong. “The mail server rejected the username/password” almost always means the password field has your normal login password instead of an app-specific password (Section 11.1) - providers refuse a program logging in any other way. “Could not reach” means the mail server/port is wrong - double-check it against Section 11.2's list for your provider.

Email notifications: test email sent OK, but a real note/finding never arrives

Check the recipient's spam folder first - a mailbox with no prior history of sending to that recipient is more likely to land there initially. Also check the two checkboxes (Section 11.2) actually cover what you're testing - a manually-typed note with “All other notes” unticked, or a PDsoft Assistant finding with “PDsoft Assistant findings” unticked, is correctly not emailed, not a bug.

APPENDIX A: QUICK REFERENCE

Control	What it does
Connect / Disconnect	Opens or closes this Setup's serial connection.
Activate (CGM-7)	Switches which grouped Setup drives the shared hardware.
Run (reset offset) / Resume run (DCM-2)	Starts the DCM-2 producing telemetry - required before recording.
Stop (DCM-2)	Stops the DCM-2's telemetry.
+ Add Setup	Adds another Setup row.
Remove	Removes this Setup entirely (not Setup 1, not the last one, not while recording).
Copy to all Setups (Setup 1 only)	Copies Setup 1's settings onto every other Setup, except port and title - skips any Setup already hand-edited since its last copy.
Choose folder...	Sets the shared working folder for all Setups.
Save setup... / Load setup...	Saves or loads every Setup's configuration, CGM-7 and DCM-2 fields alike. Loading also auto-connects every restored Setup to its saved port.
Start recording	Begins a round-robin recording pass across every eligible Setup.
Stop now	Aborts the current Setup's cycle immediately, no final row logged.
Finish all setups	Lets every Setup finish its own cycle before stopping.
Note: field / Add note	Adds a note to the Activity log, and (if something's recording) that Setup's data file and chart.
Open data file...	Views any old/arbitrary PDsoft log CSV as a full-history chart.
Viewing dropdown (Data & Plot)	Picks which Setup's chart is shown, or All Setups.
Live / Full history	Rolling recent window vs. the whole session reloaded from disk.
Refresh history	Re-reads the data files from disk.
Clear	Wipes the current chart.

Control	What it does
Light mode	Toggles the whole app's theme.
Silent mode	Suppresses advisory pop-ups app-wide.
Remote control	Opens the Remote Control dialog (Section 10).

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