

CORRTEST CS320X

MODEL-SPECIFIC TECHNICAL CATALOG

Multichannel potentiostat / galvanostat

Architecture • independent channels • EIS • parallel test design

ENGLISH EDITION | TECHNICAL REFERENCE

A dedicated reference for the CS320X configuration

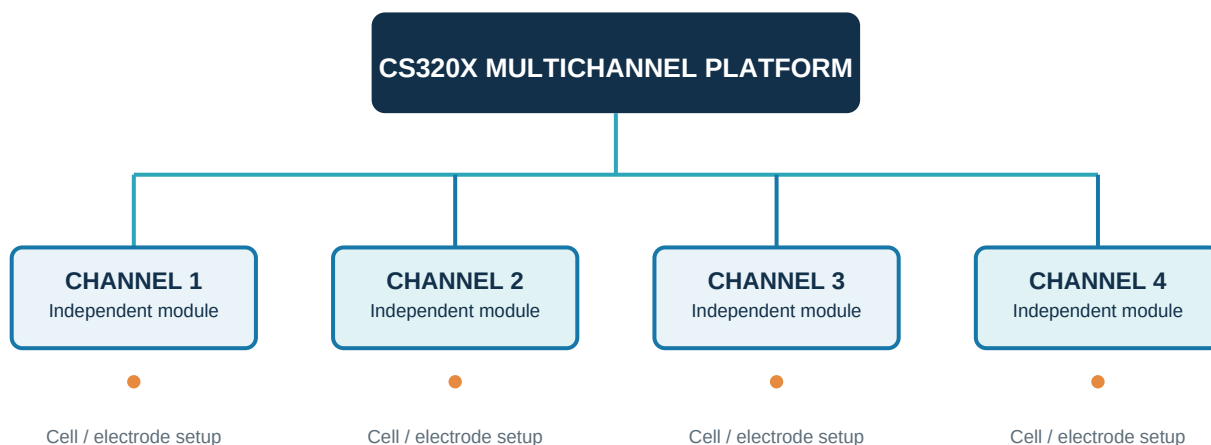
This document is written around the CS320X identity and its published multichannel architecture. It is not a renamed CS350X brochure. The emphasis is on what changes when a laboratory moves from one experiment at a time to independently operated electrochemical channels: experiment allocation, channel-level controls, comparability, EIS planning, and defensible data handling.

Document status: independent technical reference prepared from publicly available CS320X product information. It is not an official factory-issued brochure or an operator manual. Confirm order-specific options and the current software revision with CorrTest before using it as a purchasing or validation specification.



1. CS320X identity and configuration logic

The CS320X is presented by CorrTest as a multichannel electrochemical workstation developed from the single-channel CS350M platform. Its distinguishing feature is the removable, independently usable channel-module concept: a laboratory can operate several experiments concurrently or use only the channels required for a given campaign. This architecture is the organizing principle of this catalog.



Conceptual functional diagram — not a wiring schematic or a photograph of the instrument.

Model-specific points that should not be lost in a generic workstation description

CS320X attribute	Published / model-specific description	Practical meaning for the laboratory
Channel architecture	2–4 channels; up to four channels can measure simultaneously per group	Parallel experiments can reduce run-to-run drift caused by changing environmental conditions.
Module handling	Each channel can be removed and used independently or in coordination with other channels	Supports staged use, service access and flexible experiment allocation; verify required power/accessories for standalone use.
Potential control range	± 10 V	The applied range is not the same as the potential actually experienced at the working-electrode interface.
Current per channel	± 2 A; optional compatible boosters are listed for higher-current work	High-current applications require checking booster compatibility, cabling, cell resistance and thermal limits.
EIS range	10 μ Hz to 1 MHz; stated frequency accuracy 0.005%	The wide frequency span requires different attention to stabilization at low frequency and parasitic effects at high frequency.

Important distinction: channel count is not the same as a guarantee of identical cell conditions. Each channel still needs a defined electrode geometry, electrolyte, temperature, wiring layout and test protocol.

2. Published technical specifications

The table below consolidates CS320X specifications found in CorrTest's product information and product update. Specifications can vary by configuration or revision; treat optional expansion hardware separately from the base channel rating.

Parameter	CS320X published value	Interpretation / qualification
Number of channels	2–4 channels	Up to four simultaneous channels per group, depending on supplied configuration.
Potential control range	± 10 V	Control range; not a statement of working-electrode accuracy under every load.
Maximum current output	± 2 A per channel	Published base output. Higher current is described as possible with compatible optional current boosters.
Current range	2 nA to 2 A; 10 ranges	Range selection affects sensitivity, noise floor and overload margin.
Current sensitivity / resolution	1 pA on product page; product update states < 1 pA sensitivity	The manufacturer uses slightly different wording across pages; confirm the exact metrological definition for the ordered revision.
Compliance voltage	± 21 V	Available cell-driving voltage is shared across the practical voltage budget of the electrochemical cell and leads.
Potential control accuracy	0.1% (full range) ± 1 mV reported in specification listings	Check the exact tolerance notation on the current model datasheet.
EIS frequency response	10 μ Hz to 1 MHz	A broad range does not remove the need to validate stability and fixture effects.
EIS frequency accuracy	0.005%	Published frequency accuracy; distinct from impedance amplitude/phase uncertainty.
CV / LSV scan rate	0.001 mV/s to 10,000 V/s in product update	Extremely broad programmed range does not mean every electrode system can follow every scan rate without distortion.
Potential expansion	Optional compatible boosters cited for 20 A / 50 A / 100 A	Booster model, wiring and safe operating envelope must be confirmed for the exact system.

Reading specification sheets correctly

Separate programmed setpoint, instrument control range, accuracy, resolution, sensitivity and effective performance at the cell. These terms describe different properties. For defensible work, record the model, channel identity, firmware/software version, selected current range, cell configuration and any external booster used.

3. Designing experiments around independent channels

The CS320X architecture is most useful when the experiment is deliberately designed as a parallel study rather than as four unrelated runs. Assign each channel a specific role before connecting the cells. A reference channel, replicate channel and controlled-variation channel can make the resulting dataset easier to interpret than simply running the same method everywhere.

Example channel plan: coating and corrosion screening

Channel	Assigned role	What must remain fixed	What may change
CH 1	Baseline coating	Substrate preparation, exposed area, electrolyte, temperature	Baseline condition
CH 2	Formulation replicate	Same protocol as CH 1; independent cell and electrodes	Replicate identity only
CH 3	Candidate coating A	Same exposed area and conditioning time	Coating formulation
CH 4	Candidate coating B	Same electrolyte, temperature and acquisition settings	Coating formulation

Why this layout is useful

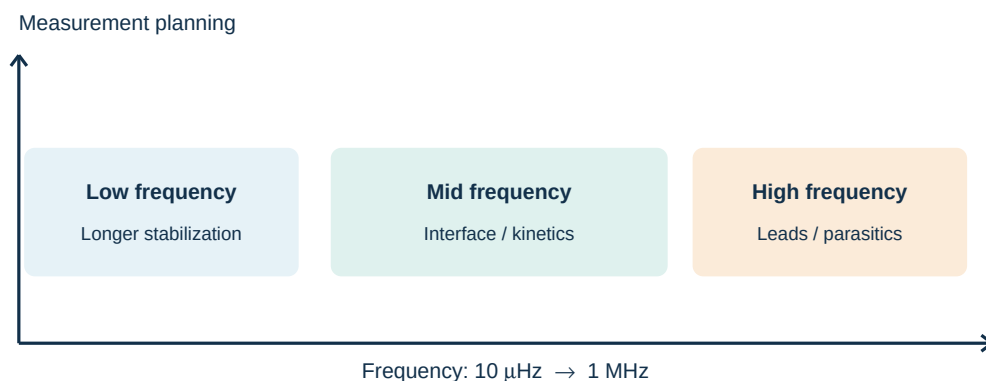
A simultaneous baseline helps reveal whether a change in impedance or polarization is associated with the candidate material or with a time-dependent shift in the electrolyte, room temperature or reference electrode. However, separate cells are not perfectly identical by default. Replicates, randomized channel assignment and a pre-defined acceptance rule are still needed.

Channel commissioning checklist

- Label physical modules and software channels consistently before collecting data.
- Verify each channel with the recommended dummy cell or test fixture before connecting valuable samples.
- Inspect working, reference and counter-electrode connections independently for every channel.
- Confirm cell area, exposed area definition, electrolyte volume, temperature and immersion depth.
- Use one written method version across comparison channels; record every deliberate deviation.
- Run a baseline check after moving a module or changing a cable layout.

4. EIS planning across the CS320X frequency span

Electrochemical impedance spectroscopy is often the most demanding workflow to compare across multiple channels because low-frequency points require time, while high-frequency points are more sensitive to wiring, grounding, cell geometry and parasitic inductance or capacitance. The CS320X's published 10 μHz –1 MHz response range should therefore be treated as an instrument capability envelope, not as a guarantee that every sample yields reliable data at every frequency.



Interpretive guide only; it does not represent measured CS320X performance data.

Low-frequency region: stability before speed

At very low frequencies, a single point can represent a long observation interval. Open-circuit drift, temperature change, slow surface evolution and non-stationary corrosion can dominate the response. Before interpreting a low-frequency arc or tail, check whether the open-circuit potential and the spectrum remain stable over the measurement period. For multi-channel work, stagger starts if the combined thermal or chemical load of the cells could change their environment.

Mid-frequency region: interface and reaction behavior

This region commonly carries information associated with charge-transfer processes and interfacial capacitance, but the equivalent-circuit model must follow the physical system. Do not assign a resistor-capacitor element solely because a fitting routine reduces residual error. Compare residual structure, parameter uncertainty and whether the fitted elements remain physically plausible across replicate channels.

High-frequency region: fixture and lead effects

At high frequency, cable length, connector condition, cell placement and inductive loops can shape the spectrum. Keep lead routing consistent across channels, avoid unnecessary cable loops, and document any channel-specific fixture. If high-frequency intercepts differ sharply between otherwise equivalent cells, investigate wiring and fixture geometry before attributing the difference to material chemistry.

Minimum EIS record per channel

Store frequency list and direction, AC amplitude, DC bias or open-circuit condition, integration/stabilization settings, selected current range, cell geometry, temperature, electrode batch, channel ID, cable arrangement and any excluded points with the reason for exclusion.

5. Choosing electrochemical methods for CS320X studies

The CS320X product information lists electrochemical analysis methods including SCV, SWV, DPV, stripping voltammetry and current monitoring, in addition to basic electrochemical methods and impedance testing. Availability of a named technique should be confirmed against the supplied software license and version.

Method / family	Useful question	Critical settings to document	Common interpretation risk
OCP / potential monitoring	Is the system approaching a stable potential or drifting?	Reference electrode, sampling interval, stabilization time, temperature	Treating a drifting baseline as a stable equilibrium.
CV / LSV	Where do redox processes or polarization changes occur?	Potential limits, scan rate, direction, cycle number, electrode area	Comparing peak current without accounting for area, scan rate or conditioning.
SWV / DPV	Can a low-level electroactive species be distinguished from background?	Pulse amplitude, step potential, pulse timing, baseline treatment	Changing pulse settings between channels and mistaking the method change for chemistry.
Stripping voltammetry	Can a preconcentrated analyte be quantified electrochemically?	Deposition potential/time, rest period, stripping waveform, electrode renewal	Ignoring carry-over, deposition efficiency or surface memory.
Chronoamperometry / current monitoring	How does current evolve after a potential step or during a process?	Step potential, sampling interval, duration, stirring/mass transport	Comparing transient current while cell area or mixing differs.
EIS	How does interfacial impedance vary with frequency and state?	Frequency range, AC amplitude, bias, stability, fit model	Fitting a non-stationary spectrum or over-interpreting a non-unique circuit.

Parallel methods are not automatically comparable

For multi-channel comparisons, use the same electrode preparation, potential reference convention, cell geometry and acquisition parameters. If one channel is used for a different method, identify it as a separate experimental role rather than pooling its results with channels that used another waveform.

6. Application-specific deployment notes

The manufacturer identifies electro-synthesis, electrodeposition, anodization, electroanalytical chemistry, electrochemical sensors, new-energy materials, corrosion assessment, inhibitor evaluation, water stabilizers, coatings and cathodic protection among the intended application areas. The examples below translate those application families into practical channel designs.

Corrosion, coatings and inhibitors

Use parallel channels for a baseline substrate, a replicate and candidate treatments. Keep the exposed metal area, surface finish, immersion time and solution aeration controlled. EIS comparisons should be paired with stability checks and, where appropriate, polarization data. A higher fitted charge-transfer resistance is not by itself proof of long-term protection if the surface is changing during the measurement.

Electrodeposition and anodization

For screening bath chemistry or potential programs, record current-time history and the exact electrode area. High-current runs require checking the selected current path, cable rating, cell heating and the compatibility of any external booster. A nominal current setting does not guarantee uniform current density when electrode spacing or geometry changes.

Electroanalysis and sensors

Use one channel for a blank or matrix control and others for standards or candidate electrodes. For SWV, DPV or stripping methods, fix pulse parameters and electrode conditioning. Include calibration range, blank variability, replicate count, detection-limit method and any electrode regeneration between measurements in the analysis record.

Energy materials and charge-storage studies

Parallel cycling or impedance studies can compare formulations under matched protocols. Match electrode loading, geometric area, electrolyte quantity, separator, cell assembly and rest times. When channels are operated simultaneously, check that the experiment schedule does not introduce unequal rest periods or unequal thermal history.

Electro-synthesis

Use independent channels to screen electrode material, applied potential or electrolyte composition while holding other variables constant. For longer experiments, record charge passed, current history, cell temperature and any gas evolution or mass-transfer changes. Electrical capability alone does not establish chemical yield or selectivity; those require an appropriate analytical measurement.

7. Troubleshooting and acceptance checks

The following matrix is intended for first-line diagnostic reasoning. It does not replace the manufacturer's service procedure, and it should not be used to open or modify energized hardware.

Observed symptom	Likely checks	Recommended discriminating test
One channel differs from the others	Electrode contact, reference electrode, cell area, selected range, cable routing, module seating	Run equivalent dummy-cell checks and swap only one known-good external component at a time.
Low-frequency EIS points scatter	Open-circuit drift, insufficient stabilization, evolving surface, temperature changes	Repeat after confirming stability; shorten the interpretation range if the sample is non-stationary.
Unexpected high-frequency inductive loop	Lead loops, connector condition, fixture geometry, cell layout	Standardize lead routing and compare with a suitable dummy cell or known fixture.
Current overload or unstable control	Cell resistance, current range, electrode spacing, booster setup, wiring	Reduce stress on the cell, confirm configuration limits and validate using an approved test fixture.
Voltammetric peaks differ between channels	Electrode preparation, reference scale, scan rate, exposed area, solution composition	Repeat with matched electrodes and a shared written method; report area-normalized and raw current.
Results shift after moving a module	Connections, module identification, setup defaults, cable placement	Recommission that channel and retain a post-move baseline record.

Acceptance record for each channel

Record field	Entry
Channel ID and module serial / label	
Instrument model and software version	
Dummy-cell or reference-check result	
Potential and current ranges used	
Electrode and cell configuration	
Baseline stability and repeatability result	
Any optional booster, adapter or accessory	
Operator, date, method version and deviations	

8. How to distinguish CS320X from CS350X in documentation

The two model names should not be treated as interchangeable. CorrTest's product information describes CS320X as the multichannel expansion of the CS350M platform, whereas CS350X is described as an expansion of the CS1350Pro platform. The key distinction for a CS320X catalog is therefore the CS350M-derived channel architecture and the way independent channels are used, not a generic list of electrochemical techniques.

Documentation item	CS320X-specific description to preserve	Avoid
Platform origin	Expanded from single-channel CS350M	Copying CS350X platform origin or presenting the two models as identical.
Channel use	2–4 channels; modules can be removed and operated independently or together	Describing only a fixed multichannel chassis without explaining module independence.
Current rating	± 2 A per channel in the published base specification	Borrowing a different model's current rating without verifying it.
EIS	10 μ Hz–1 MHz, frequency accuracy stated as 0.005%	Claiming 5 MHz based on another CorrTest model.
Optional current expansion	Compatible booster options must be verified for the exact configuration	Presenting booster current as the standard output of every channel.
Experimental value	Parallel comparison, replication and channel-level test planning	Filling pages with generic buying advice or unrelated model descriptions.

Specification control before ordering

Ask the supplier to confirm the number of supplied modules, whether each module can run standalone with the included accessories, software technique licenses, included dummy cells, booster compatibility, channel synchronization behavior and the exact revision of the technical specification sheet. Record answers against the quotation or order confirmation.

9. Laboratory handover checklist

Use this checklist when receiving a CS320X system or introducing a new channel into an existing workflow.

- Confirm the nameplate model is CS320X and record the serial number.
- Inventory the supplied modules and match each one to its channel identity.
- Verify computer interface, software installation, access permissions and method availability.
- Check supplied cables, power supplies, simulated cells and any requested accessories.
- Run a basic test on each channel separately before running a parallel experiment.
- Run a parallel dummy-cell or equivalent check to assess channel-to-channel consistency.
- Save a baseline method file and a template for metadata and channel identification.
- Document optional boosters and their approved current / voltage operating envelope.
- Train users on channel allocation, cell wiring, file naming and safe shutdown.
- Archive the current specification sheet and the supplier's configuration confirmation.

Technical notice and limitations

This is an independently prepared English technical reference focused on CorrTest CS320X. It is not an official CorrTest-issued catalog, certificate, calibration document or operation manual. Conceptual diagrams are explanatory drawings, not photographs, wiring diagrams or measured performance curves. Product specifications above are summarized from publicly available manufacturer information; where wording differs between published pages, the discrepancy is explicitly noted. Confirm the exact delivered configuration, revision, accessories and operating limits with the manufacturer or authorized supplier before procurement, validation or safety-critical use.

Model information consulted: CorrTest CS320X product page and CS320X product update. This PDF intentionally avoids reusing the previous CS350X-oriented narrative and instead focuses on CS320X-specific channel architecture and experiment design.