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FCI METROLOGY WHITE PAPER SERIES · WP-002

The Three Keys to Calibration Traceability

Why every calibrated instrument needs three independent identifiers, and what happens when one of them goes missing.

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AUTHOR	AUDIENCE	ALIGNS TO
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ISO/IEC 17025:2017 accredited calibration laboratory
International Accreditation Service, certificate CL-112

Executive Summary

An accredited calibration is only as defensible as the link between the certificate and the physical instrument it describes. When that link breaks, the certificate still looks perfect. It still carries the signature, the uncertainty and the accreditation mark. It simply describes an instrument that may no longer be the one in production.

Field Calibrations recommends that every calibrated instrument carry three independent identifiers. We call them the Three Keys.

- **CAID**, the Customer Asset ID assigned by your asset management system.
- **FCID**, the Field Calibration ID that FCI assigns at enrollment. It is permanent, unique across the entire FCI population and never reused.
- **Serial number**, the manufacturer's serial or, when none exists, a unique serial that FCI engraves at enrollment.

Like the three keys to a high security lock, all three must be present and unique to seal the chain of traceability for each instrument. Compromise any one of them and the chain can break without a single visible symptom. We call that a silent traceability failure.

1. What ISO/IEC 17025 Actually Requires

ISO/IEC 17025:2017 requires a laboratory to identify calibration items unambiguously while they are in its care (§7.4.2) and to describe and identify the calibrated item unambiguously on every certificate (§7.8.2.1(g)). It requires metrological traceability through a documented, unbroken chain of calibrations (§6.5), and a statement on each certificate of how the measurements are traceable (§7.8.4.1(c)).

The standard does not prescribe an identifier scheme. It requires only that identification be sufficient to tie a certificate to one physical instrument without ambiguity, and that the chain stay intact between calibration events. The Three Keys are our recommended way to meet that requirement on a real shop floor, where labels fall off, instruments get swapped and asset records lag behind what actually happened. Other methods can satisfy the standard on paper. Few survive a worst case audit, a recall or a root cause investigation as well.

2. What Each Key Does

Key	Owner	What it does
CAID **Customer Asset ID**	You	Your logical identifier for the asset, usually tied to a purchase, cost center, location or function. It lives in your maintenance, ERP or calibration management system and is the number you use to schedule, report and budget for the instrument over its life.
FCID **Field Calibration ID**	FCI	Our permanent identifier, assigned at enrollment and never reused. It appears on every certificate, recall list and as-found and as-left record, and it is how we retrieve history, reproduce uncertainty budgets and answer recall or impact assessment requests.
Serial number **Manufacturer or engraved**	The instrument	The physical identity of the instrument itself, and the only one of the three that survives a label swap, a lost label or a substituted part. When a manufacturer's serial is missing, FCI engraves a unique one at enrollment.

3. How the Three Keys Protect Each Other

Each key covers a specific failure in the other two.

If this happens	What still protects the record
Your label peels off or is destroyed	The FCID and the serial number on the instrument body still bind the certificate to the item.
An instrument is swapped or a replacement is substituted	The serial no longer matches the certificate or the FCID record, and the mismatch is flagged at receipt. The new instrument cannot inherit the old one's traceability.
An FCI enrollment record is lost or corrupted	Your CAID and the physical serial let the asset and its history be reconstructed.
A CAID is reused on a replacement	The unique serial prevents the new item from inheriting the old item's calibration history, because the certificate is tied to the serial and not only to the CAID.

4. A Failure Nobody Sees

> **Silent traceability failure, a pressure gauge example**
>
> A pressure gauge arrives at FCI without a manufacturer's serial number. It is calibrated under its CAID and a newly assigned FCID, then returned to service. Months later it breaks in the field. A technician pulls an identical gauge off the shelf, moves the asset tag to the replacement and puts it into production.
> The replacement has never been calibrated, yet the records still show an unbroken history under that CAID. When an audit finally uncovers the substitution, every product the gauge measured is in question. The chain broke on the day of the swap, not on the day it was discovered.

Had a unique serial been engraved on the original gauge at enrollment, the substitution would have been caught the moment the replacement arrived for its next service, because the CAID and FCID would no longer match the serial on the instrument.

5. Our Recommendations

For every customer

- Require a unique serial number on every instrument in your calibration program. If a manufacturer's serial is missing, ask FCI to engrave one at enrollment.
- Treat the CAID, FCID and serial number as a three part match at every receipt. Any mismatch should pause the work until you confirm the item in writing.
- Record all three identifiers on your asset records, work orders and recall lists.

For customers whose policy allows CAID reuse

Some organizations allow a CAID to move to a like item replacement. That is your policy to set. It is also exactly the situation where the serial number matters most, because the serial is what stops a new instrument from silently inheriting the history of the old one. We recommend the following.

- Wherever practical, stop reusing CAIDs and issue a new CAID for any physically new instrument.
- Where reuse remains policy, require a new unique serial on every replacement so the record can tell the two apart.
- Treat any same CAID, different serial event as a mandatory re-enrollment, with a new FCID and a clean calibration history.

6. Why It Matters on the Worst Day

When an instrument is found out of tolerance or a recall is issued, investigators ask one question. Which products were measured with the affected instrument, and during what window? Answering it requires proof, document by document, that the instrument named on each certificate is the same physical instrument that was in production.

With one identifier, that proof rests on a single printed label. With three independent identifiers, the record is layered, redundant and resistant to the slow administrative drift that auditors and regulators are trained to find.

7. Putting the Three Keys to Work with FCI

Situation	What happens
New enrollments	You provide the CAID. FCI assigns the FCID and verifies the serial number, engraving a unique one if none exists.
Existing instruments	At your next on-site visit, FCI can review your instrument population, identify items without a serial number and engrave them in place.
Records hand-off	FCI provides an asset list that maps CAID, FCID and serial number for your maintenance or calibration management system.
Cost	Engraving is included at no charge during initial enrollment and at the next scheduled calibration. Stand-alone engraving visits are quoted under the current on-site rate schedule.

ISO/IEC 17025 requires unambiguous identification and unbroken traceability. It does not say how. The Three Keys close the silent failure gap that label transfers and substitutions open in a single identifier system.

Questions or next steps

Want to review your instrument population or set up engraving at your next visit? Contact the Quality Assurance Manager at quality@fieldcal.com or call (480) 756-8828. The full white paper series is available at fieldcal.com/resources.