OpenVVVF

TEST REPORT

Inductance Calibration Validation

> Validation of the inverter motor-inductance calibration routine on a TECO MAX-IE3 induction motor.

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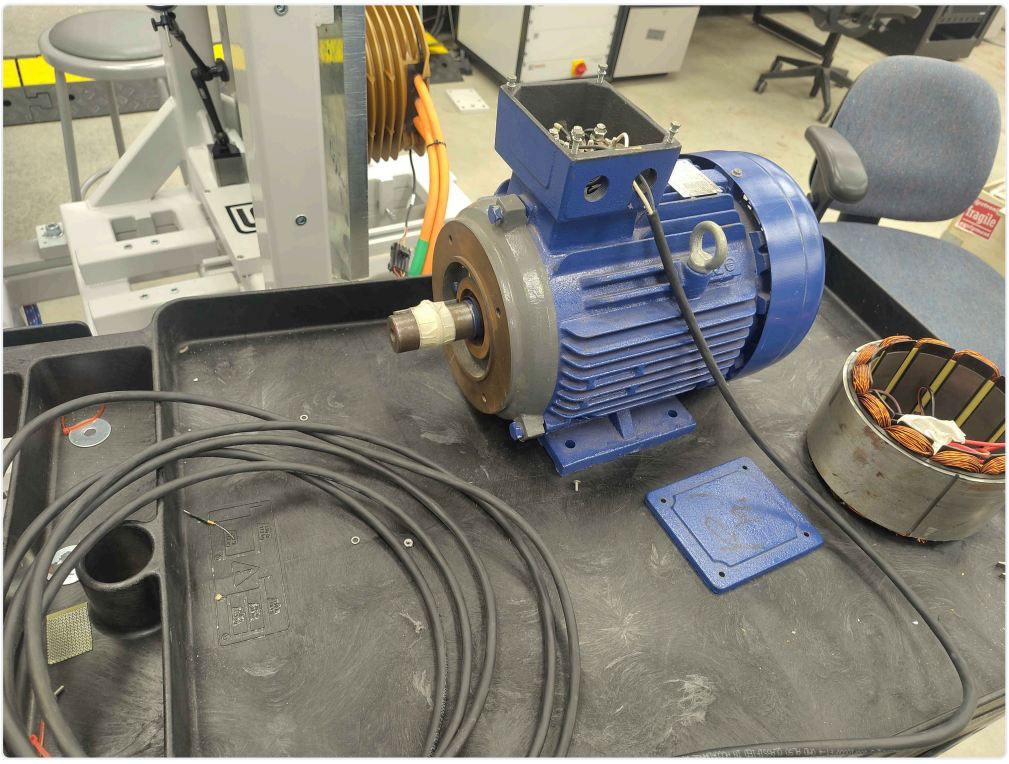
1. Inductance Calibration Validation

This report validates the inverter's `cal Motor.Induction.VHz` routine on a TECO MAX-IE3 7.5 kW induction motor. The test is run on the C2 chassis test fixture; the routine itself is shared across all OpenVVVF chassis.

1.1. Test setup

The motor is the same TECO Westinghouse MAX-IE3 3-phase induction motor used for the resistance calibration. Phase leads are accessed at the conduit box for direct LCR measurement.



TECO MAX-IE3 motor on the test bench

1.2. Reference measurement

Parameter	Value	Instrument settings
Ls	17.8565 mH	FUNC: Ls-Rs, FREQ: 1.000 kHz, LEVEL: 2.000 V, RANGE: AUTO, SPEE
Rs	55.4948 Ω	FUNC: Ls-Rs, FREQ: 1.000 kHz, LEVEL: 2.000 V, RANGE: AUTO, SPEE

LCR meter Ls-Rs reading: Ls = 17.8565 mH, Rs = 55.4948 Ω

1.3. Inverter calibration result

Command: `cal Motor.Induction.VHz`

The routine applies a 10 Hz V/Hz excitation and hunts for a modulation index that produces roughly 5 A of phase current. It then sweeps several modulation points around that operating point and reports the calculated series inductance `Ls` at each point. The test was repeated at three DC bus voltages to check consistency.

1.3.1. 40 V bus run

Point	Modulation	Current	Phase	Ls
1	0.182	3.28 A	136.9°	20.86 mH
2	0.221	4.28 A	139.0°	18.68 mH
3	0.260	4.68 A	142.1°	18.78 mH

1.3.2. 80 V bus run

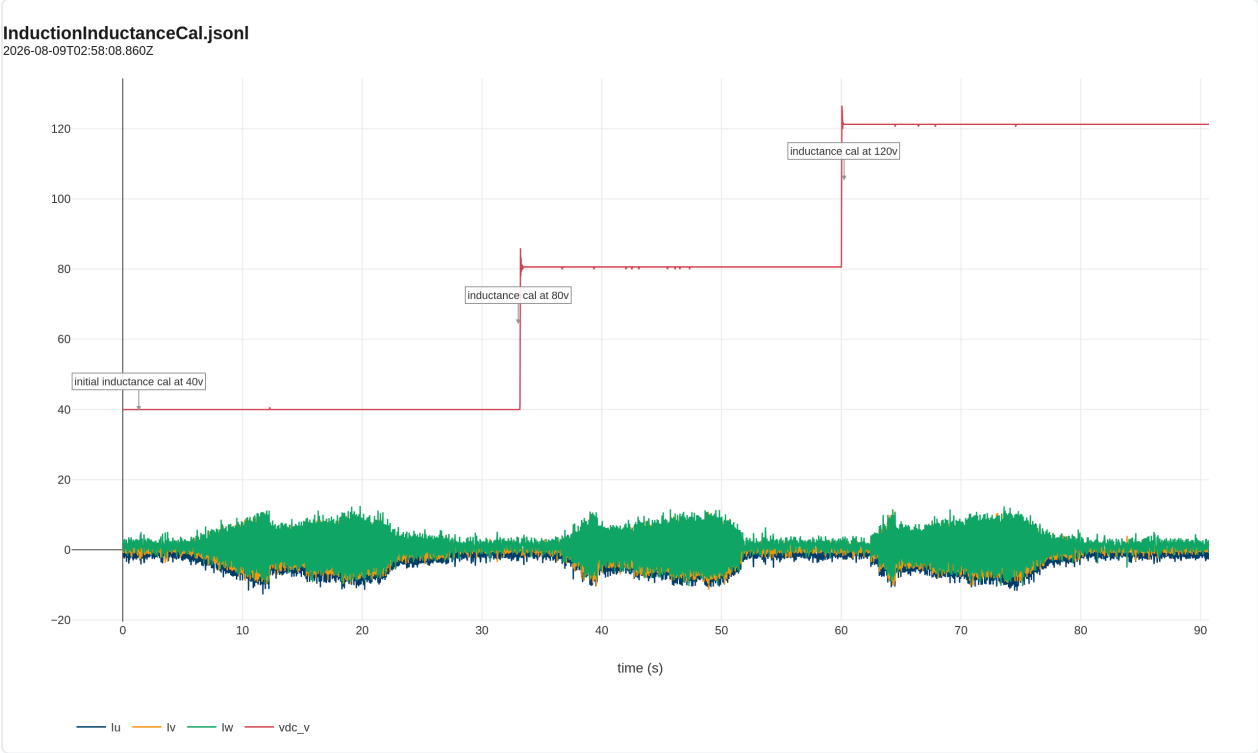
Point	Modulation	Current	Phase	Ls
1	0.084	2.98 A	136.0°	21.71 mH
2	0.102	3.98 A	137.7°	19.19 mH
3	0.120	4.71 A	140.1°	18.14 mH

Points 4 and 5 were rejected because the current dropped below the slip threshold.

1.3.3. 120 V bus run

Point	Modulation	Current	Phase	Ls
1	0.056	3.01 A	135.9°	21.62 mH
2	0.068	4.00 A	137.7°	19.15 mH
3	0.080	4.74 A	140.2°	18.06 mH
4	0.092	4.04 A	145.0°	21.80 mH

Point 5 was rejected because the current dropped too low.



Telemetry from the inductance calibration runs

OPEN TELEMETRY LOG:

View this calibration in the Telemetry Viewer

1.4. Comparison and conclusion

The highest-current point in each sweep is the most reliable because the phase voltage across the inductance dominates the IGBT knee and dead-time offsets. Averaging those points:

Quantity	LCR reference	Inverter estimate	Difference
Ls at ~4.7 A	17.86 mH	~18.3 mH	+2.4 %

The inverter estimate is within a few percent of the LCR reference. The small positive offset is expected: the inverter measurement is taken at a few amperes of excitation current, where slight saturation can raise the apparent inductance compared with the 2 V LCR reading, and the V/Hz estimate includes a small resistive drop correction.

For motor-control purposes, this level of agreement is acceptable. The calibration gives a consistent inductance value across 40 V, 80 V, and 120 V bus levels.

1.5. Artifacts

- Telemetry log (JSONL) - open in Telemetry Viewer
- Static inductance plot (PNG)
- Static inductance reference photo (JPG)

1.6. Notes

- The Ls-Rs reading is the series inductance and resistance at 1 kHz from the LCR meter.
- The `Rs` value at 1 kHz is the AC series resistance; it is not the same as the DC resistance recorded in the resistance calibration report.
- This motor is an induction machine, not a PMSM, so it is tracked separately from the PMSM calibration report.