OPENVVVF

TEST REPORT

Inductance Calibration Validation

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

Document ID	OV-TEST-HW-INDUCTION-IND-CAL
Test ID	6
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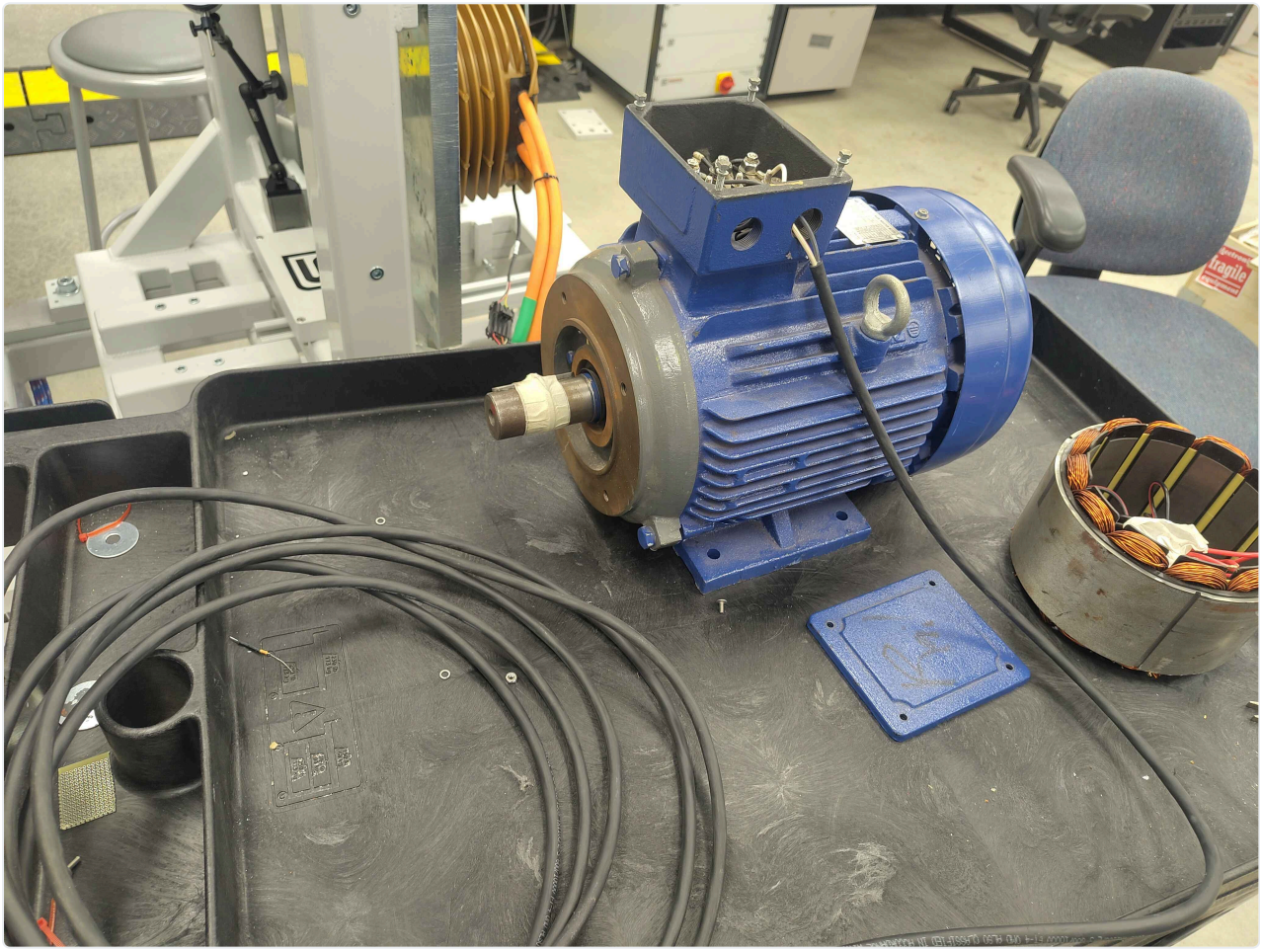
Status	draft
Applies to	openvvvf-control-module, chassis-size-2
Product line	openvvvf
Normative references	OV-TEST-HW-INDUCTION-CAL-INDEX, OV-TEST-HW-INDEX

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.



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, SPEED: FAST
Rs	55.4948 Ω	FUNC: Ls-Rs, FREQ: 1.000 kHz, LEVEL: 2.000 V, RANGE: AUTO, SPEED: FAST

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

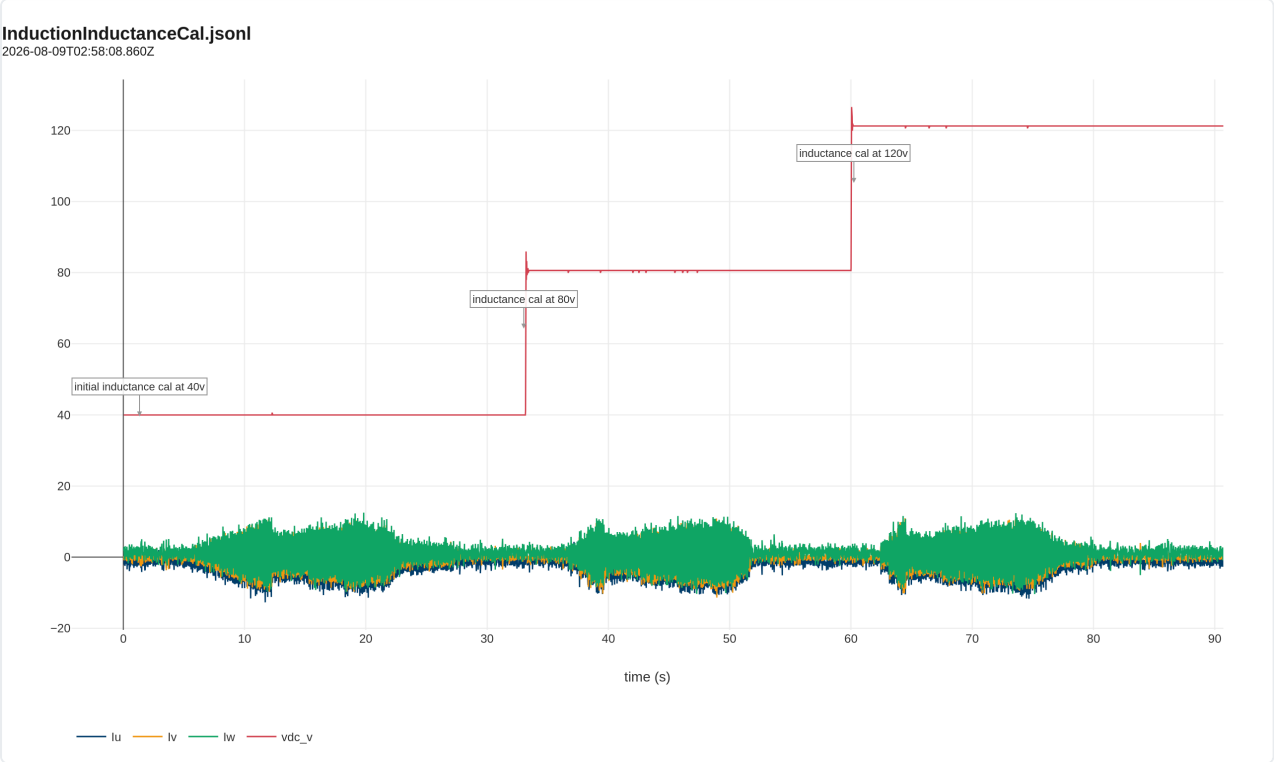
Point	Modulation	Current	Phase	Ls
1	0.084	2.98 A	136.0°	21.71 mH
2	0.102	3.98 A	137.7°	19.19 mH
3	0.120	4.71 A	140.1°	18.14 mH

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.



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.