

TEST REPORT

Induction Motor 180 V Power Stage Bring-up

Bring-up run of the C2 power stage with 200 V capacitors, driving the TECO MAX-IE3 induction motor up to 180 VDC bus.

Document ID	OV-TEST-HW-INDUCTION-180V-BRINGUP
Test ID	8
Version	0.1
Date	2026-08-09
Status	draft
Applies to	openvvvf-control-module, chassis-size-2
Product line	openvvvf
Normative references	OV-TEST-HW-INDUCTION-CAL-INDEX, OV-TEST-HW-INDUCTION-NOLOAD-1H, OV-TEST-HW-INDEX

1. Induction Motor 180 V Power Stage Bring-up

This report records the first time the C2 power stage was operated with 200 V DC-link capacitors at elevated bus voltage. The TECO MAX-IE3 induction motor was used as a load while the DC bus was stepped from ~140 V up to ~180 V to validate capacitor hold-off, gate-drive operation, and current regulation at the higher rail.

1.1. Test setup

- **Motor:** TECO Westinghouse MAX-IE3 3-phase induction motor, 10 HP / 7.5 kW, 208 V, 60 Hz
- **Inverter:** OpenVVF C2 chassis with 200 V DC-link capacitors
- **Control:** V/Hz open-loop excitation, no mechanical load
- **Instrumentation:** Tektronix 5 Series MSO oscilloscope, controller telemetry

1.2. Test conditions

Parameter	Value
DC bus voltage	stepped 140 V -> 150 V -> 170 V -> 180 V
Commanded frequency	~60 Hz
Mechanical load	None (free spinning shaft)
Duration	~10 min (604 s)
Ambient temperature	~23 °C

1.3. Electrical observations

The telemetry plot below shows the entire bring-up sequence. The DC bus was increased in discrete steps while the motor remained under V/Hz excitation. Phase current magnitude grew with bus voltage as expected for a no-load magnetizing characteristic, reaching brief peaks above 35 A during transients.

Key events from the log:

Time (s)	Bus voltage	Observation
0 - 160	~142 V	Stable no-load excitation, small currents
~160 - 180	dip to ~30 V then back to ~142 V	Bench supply current limit was too low; motor slip kept current demand high, collapsing the bus until the current limit was raised
180 - 320	~142 V	Continued stable operation
320 - 420	~152 V	First voltage step; currents remain moderate
420 - 520	~172 V	Second voltage step; current ripple increases
~520	data pauses	<code>control stop</code> halted the ISR and telemetry; <code>control start</code> resumed sampling
520 - 560	~172 V	Operation resumes after control restart
560 - 604	~181 V	Final step to ~180 V; peak phase current ~38 A



OPEN TELEMETRY LOG:

View the 180 V bring-up in the Telemetry Viewer

1.4. Results

- The 200 V capacitor bank held the ~180 V rail without issue.
- Gate-drive and current sensing operated correctly across all voltage steps.
- The controller recovered cleanly after the ~160 s bus collapse once the bench supply current limit was raised.
- Maximum observed DC bus voltage: **182.5 V**.
- Maximum observed phase current (transient): **~38 A**.
- Telemetry was paused around 520 s by `control stop` and resumed with `control start` ; no data was lost in the JSONL export.

1.5. Conclusion

The C2 power stage with 200 V DC-link capacitors successfully ran at 180 VDC while driving the induction motor. This confirms the hardware is usable for nominal 200 V-class DC buses and provides confidence for future higher-voltage loaded tests.

1.6. Artifacts

- Decimated telemetry log (JSONL, 0.2 s) - open in Telemetry Viewer
- Telemetry overview plot (PNG)

1.7. Notes

- The full-rate telemetry log is ~157 MB; the linked file is decimated to 0.2 samples per second for the repository.
- This was an unloaded motor test; loaded current levels at 180 V will be higher and require additional validation.