AN009-Running Several Motors in Parallel on One Clean Power VFD

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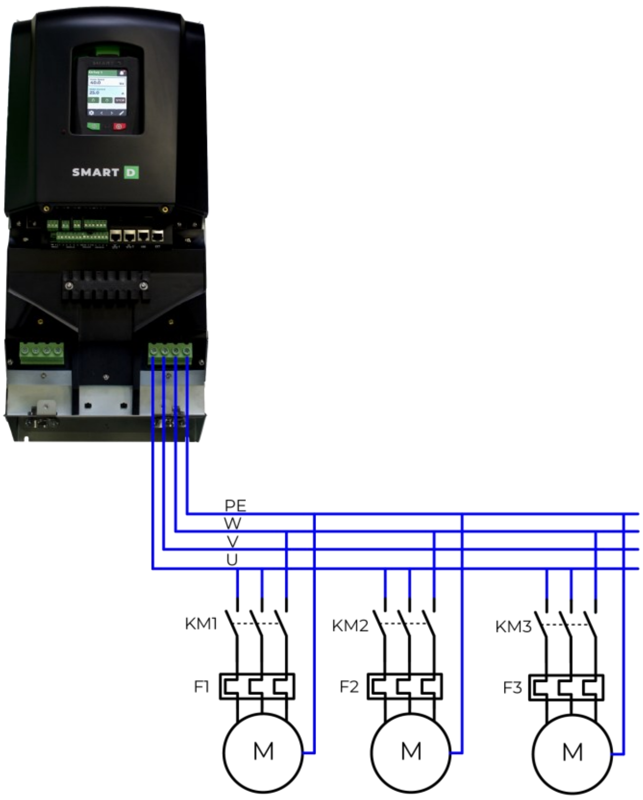

1. Disclaimer - Running several motors in Parallel on One Clean Power VFD

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2. Running Several Motors in Parallel on One Clean Power VFD

Using one Clean Power VFD to run several motors in parallel can be a smart way to save space, simplify wiring, and reduce cost, especially for fan and pump arrays that always run at the same speed.

The Clean Power VFD's sine-wave output also lowers stress on cables and motors, which helps when you have multiple drops from a single drive.

This setup, however, changes how protection, control, and commissioning must be done. A single drive "sees" only the total load; it cannot protect or diagnose each motor on its own. Some advanced features that rely on a unique motor model per drive (for example, per-motor auto-tuning) are not applicable here.

This application note gives practical, safe guidance to design, commission, and operate multi-motor systems with the Clean Power VFD.

What you'll get

- Clear do's and don'ts for multi-motor control on one VFD
- Recommended wiring architecture and protection (with per-motor overloads)
- Drive sizing and parameter choices that work in the field (V/Hz mode, conservative ramps)
- A commissioning checklist and basic troubleshooting steps
- Safety notes and code-aware recommendations to discuss with your AHJ

Scope and assumptions

- Multiple **induction motors** of similar ratings, same voltage/frequency, running from a common speed command
- No reversing or independent speed/torque control per motor
- Group installations that follow applicable electrical codes (NEC, IEC, or local equivalents)

What this is not

It is not a replacement for the user guide or certified drawings

It is not an application that requires switching motors on/off while the VFD is energized

Read the safety and responsibility section first, then use the sections that follow to plan your design, verify protections, set parameters, and commission the system safely.

2.1. safety and responsibility

⚠ WARNING

A single VFD driving multiple motors **cannot** individually protect each motor. The drive "sees" one aggregate load and cannot detect overcurrent or thermal overload on a specific motor. You **must** add **per-motor overload protection** (thermal/electronic) downstream of the VFD.

Do **not** switch contactors on the VFD output while the drive is producing voltage. If you must isolate a motor, first **stop** the drive and de-energize its output, then open the downstream device.

Follow your local electrical code. In the US, multi-motor circuits are governed by **NEC 430.53** (group installations) and related sizing/overload rules. Canada has parallel requirements in the Canadian Electrical Code CEC Article 28-200, "Several motors or other loads on one branch circuit".

If you are not fully comfortable with these rules, consult a licensed professional for guidance.

3. Application details: Running Several Motors in Parallel on One VFD

When a single-VFD / multi-motor scheme is appropriate

Use one VFD for several motors when all of the following are true:

- same speed command for every motor,
- similar motor ratings (Voltage, power, poles),
- no independent reversing,
- acceptance of single point of failure,
- and operation in **V/Hz (scalar)** mode.

If any of these aren't true, use one VFD per motor.

Why the Clean Power VFD helps here (and what it doesn't change)

The Clean Power VFD produces a **sine-wave output** with ultra-low dv/dt and harmonics, easing motor stress and enabling **long cables** without external dv/dt or sine-wave filters. This is beneficial when a single drive powers multiple motors

- **Sine-wave output**: ultra-low dv/dt and harmonics; friendly to motors/cables.
- **No external output filters**: fewer parts, less heat, simpler panels
- **Long-cable capability** simplifies layouts, makes multi-drop layouts easier, and remote motors without special cables.

Codes, standards, and "group motor" basics

- NEC 430.53 (and CEC equivalents) govern multi-motor branch circuits.
- Per-motor overloads are required; upstream SCPD (Short-Circuit Protective Device). The overload/overtemperature protective means must interrupt current flow to the motor either by causing a shutdown of the VFD or by opening the circuit feeding the protected motor.
- If you design under IEC/EN or NFPA 79 for machinery, apply the analogous clauses; the principle of per motor overload and proper upstream SCPD remains the same.
- Validate your protection scheme with your Authority Having Jurisdiction (AHJ).
  It's the organization, office, or individual that interprets and enforces the code for your project and approves/inspects the equipment, materials, installation, or procedures.
  Typical AHJs: local electrical/building inspector, fire marshal, insurance underwriter, or a third-party certifier (depends on location and facility type).
  Why it matters: the AHJ has the final say on code compliance—e.g., whether your VFD/multi-motor setup, protection scheme, and documentation are acceptable.

Mechanical & matching recommendations

Use motors with the same voltage, base speed, poles, efficiency class, and enclosure. Keep loads balanced.

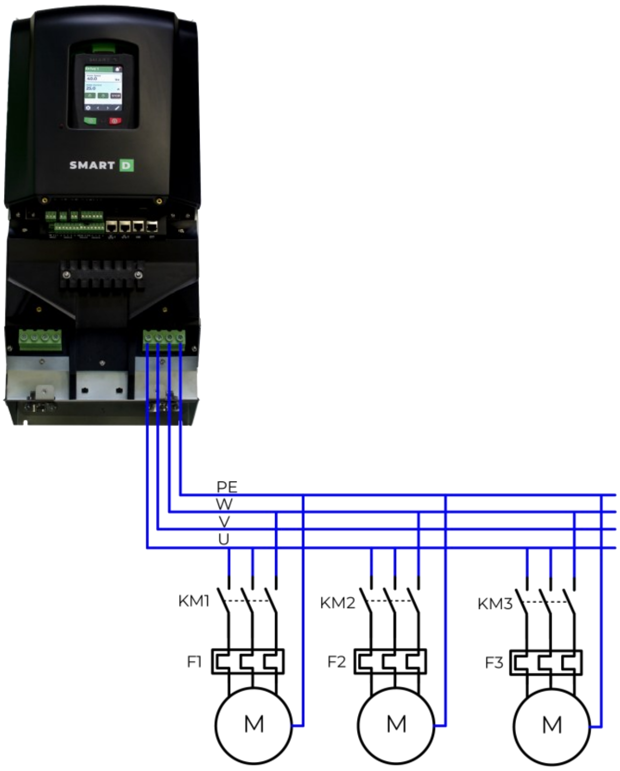
Cabling, EMC & grounding

- **Cable type:**
  You can often use conventional motor cable (size per code and user guide) instead of special "VFD cable."
  Tip: Keep runs symmetrical and well-bonded to promote current sharing.
- **Topology:**
  Use a star (radial) layout from a common output terminal block to each motor.
  Avoid daisy-chaining motor-to-motor.
- **Length matching:**
  Keep branch cables similar in length and type to balance impedance and sharing.
- **Aggregate length limit:**
  For drive output limits, the VFD effectively "sees" the sum of all branch lengths.
  Example: 3 motors × 50 m each ⇒ aggregate = 150 m.

What not to do (limits)

- No per-motor vector/encoder tuning on one VFD.
- Don't run the auto-tuning with several motors connected.
- Don't open/close downstream contactors while running.
- Don't rely on the VFD for individual motor protection.

4. Implementation guide: Running Several Motors in Parallel on One VFD



Electrical architecture (recommended)

Input side of the VFD: Size feeder, disconnect, and Short-Circuit Protective Device (SCPD) per code.

Output side: Star topology to each motor; add **per-motor electronic overloads** (rated for VFD output).

Optional per-motor isolators for maintenance—used only with the VFD stopped.

Thermistors/PTC in each motor: wire to separate relays with auxiliary contacts wired in series to one input if you only need a global trip.

Retrofit of an installation where the cables are not of the same type

Not all motor cables load the drive the same way. Shielding and construction change the cable's capacitance, which makes the VFD work harder—so we **count some cables as "longer" than they physically are:**

Convert each branch into an **effective length** using the guide below, then simply add the effective lengths of all branches.

- Unshielded cable in conduit: count it as-is (10 m → count 10 m).
- VFD-rated low-capacitance shielded cable: count it a bit heavier, x1.5 (10 m → count ~15 m).
- Standard shielded tray cable (foil + drain/braid): count it roughly double (10 m → count ~20 m).
- Multiple cables in parallel to one motor: count each run.
- Unknown or mixed cable types: be conservative, use the higher multiplier rule.
- Clean Power VFD note: the sine-wave output greatly reduces dv/dt stress, but total effective length still matters because total capacitance still adds up.

Example:

Branch A: 25 m unshielded → count 25x1.0 = 25 m

Branch B: 25 m shielded tray → count 25x2.0 ~50 m

Branch C: 15 m VFD-rated shielded → count 15x1.5=22.5 ~20-23 m

Total effective length = ~95 m (use this against the drive's long-cable guidance).

Drive sizing & key parameters

- **Current rating:** Sum all motor FLAs and add engineering margin (≈20% typical). The sum can not exceed the drive's rated capability.
- **Control mode:V/Hz (scalar)**; do not use vector control mode (iFOC)
- **Motor data:** Enter base V/f per nameplate. Set VFD current limit to the **aggregate** current (do not use it as per-motor protection).
- **Acceleration/Deceleration:** Use conservative ramps.

Control command implementation — use External Alarm

Use a **user-defined event/alarm** (External Alarm) on an available **digital input** to inhibit the output stage.

Map the chosen DI to the **User Defined Alarm with a severity of Major.** This will trigger a stop in freewheel.

Set the DI as a **fail-safe**: use the normally closed contact of the actionner (like a push button or rotary switch) wiring, and set the trigger type to low so an open circuit triggers the alarm.

Add a small debounce (e.g., 200–500 ms) in logic before and after asserting the alarm.

Commissioning checklist

1. **Design review:** Check applicable code and related protective devices.
2. **Wiring:** Star from T1/T2/T3; equalize branch lengths; verify grounds/bonding.
3. **Drive settings:** V/f mode; nameplate V/f; aggregate current limit; conservative ramps.
4. **Functional tests:** First with one motor; then add motors one by one (drive stopped between changes).
5. **Protections:** Validate each motor's overload/thermistor trip.
6. **Documentation:** Record settings with measured branch currents and cable lengths.

Example sizing (conceptual)

- Three × 5 HP @ 460 V; each FLA ≈ 7.6 A → Sum = 22.8 A.
- Add 20% margin → **27.4 A** minimum continuous output.
- Select a Clean Power VFD frame ≥27.4 A. Set each overload relay ≈ motor FLA (tune per duty/nameplate).

Troubleshooting tips

- **One branch hot/high current:** Check branch length mismatch, terminations, bearing/load issues.
- **Overvoltage trips on deceleration:** Lengthen deceleration, handle regen energy appropriately.
- **Low-speed hunting:** Verify V/f setup, increase acceleration time, and adjust boost within limits.

4.1. Safe expansion of a multi-motor configuration

⚠ WARNING

With the current Clean Power VFD, **do not switch downstream contactors while the VFD is energizing the output**. Adding motors "live" is **not supported**. Use the **Stop-to-Add** method below.

Safe Group Expansion (Stop • Disable • Connect • Restart)

It's the preferred (supported) method: **Stop-to-Add**

Operate one Clean Power VFD that already runs a subset of identical motors (same speed command), then bring one or more additional motors onto the same VFD output without switching under active power output.

The sequence

- pauses the drive,
- positively inhibits the output (Interlock/Motor Disable),
- Update and check the VFD configuration,
- closes the new motor contactors with feedback,
- re-arms the drive,
- and restarts the entire group cleanly.

Use this when load increases (seasonal peak, production ramp), after maintenance return-to-service, or when commissioning staged equipment (e.g., fan walls, pump banks).

Preconditions

- Each motor has its **own overload device** (set to that motor's FLA).
- Each branch has a **lockable isolator** (or fused switch) downstream of the VFD.
- Control mode is **V/f (scalar)**.
- You know the **effective cable length** rules (shielded runs "count longer").
- You can accept a short stop of the group (single point of failure acknowledged).

Installation and commissioning

1. **Notify & prepare**
    - Announce a planned stop, verify the process can pause safely.
    - Save a current **parameter backup** of the VFD.
2. **Stop & de-energize**
    - Command **Stop**. Wait for "stopped" status and DC bus discharge indication.
    - If available, apply or safe-to-open output (POU) upstream of the branches. A motor disabled function, such as an interlock, fits this need.
3. **Isolate all existing motors**
    - Open the per-motor isolators so no motor is connected to the VFD output.

4. **Connect and test each new motor—one at a time**
   - Close the isolator for **only the new motor #1**.
   - **Keep phase order consistent** with the existing branches.
   - Update the drive's **current limit** temporarily to that single motor's FLA (or keep the existing aggregate limit—either is fine for this single-motor test).
   - **Start** the VFD at low frequency (e.g., 5–10 Hz). Check **rotation** and abnormal noise.
   - Measure branch current; confirm it's reasonable vs. nameplate at the chosen speed.
   - **Stop**, open that isolator, and repeat for each additional new motor.
5. **Update protections & settings**
   - Set each **overload** to the motor's nameplate FLA and class (10/20, per duty).
   - Recalculate **aggregate FLA** = (old group FLA) + (sum of new motors' FLA). Update the VFD **current limit** and any internal overload setting to that **aggregate** value.
   - Recalculate **effective total cable length** (apply your cable-type corrections). If you're now over the product's long-cable guidance, mitigate (shorten runs, split the group, or change cable type).
6. **Re-connect the full group**
   - Close isolators for **all intended motors** (existing + new).
7. **Restart cleanly**
   - Use a **conservative acceleration ramp** (e.g., 10–20 s or more) for the first ramp.
8. **Verify sharing & temperatures**
   - At a steady speed, measure **each branch current**.
   - Target: branches within **±10%** of each other (tighter if loads are identical).
   - If one branch is consistently high, check cable length mismatch, terminations, motor condition, or load.
9. **Functional checks**
   - Trip a **single motor's overload** to verify selectivity and annunciation.
   - If you use **thermistors** (PTC), confirm each channel trip and is reported.

10. **Document**

- Record: updated aggregate FLA and current limit, all overload dial settings, each branch length (physical and "effective"), measured branch currents at a known speed, and any parameter changes.

For awareness — "Live add" while others run (not supported)

Some architectures stage motors on/off under load using special VFD features (output-contactor control, pre-magnetization, coordinated flying-start per branch). The current Clean Power VFD **does not provide** that control scheme. **Do not** attempt to close a motor contactor onto an energized VFD output; you risk over-voltage/current spikes, nuisance trips, or equipment damage.

If you cannot stop the process, use one of these designs instead:

- One VFD per motor, or
- Split the array across two VFDs so one group can pause while the other runs, or
- Provide an across-the-line bypass for temporary fixed-speed operation while adding branches offline.

Quick acceptance criteria after adding motors

- Drive starts smoothly with conservative acceleration; no DC-bus overvoltage on deceleration.
- Branch currents are balanced (≈ **±10%**).
- VFD current limit ≥ **sum of all motor FLAs** (plus your margin).
- Effective total cable length within guidance; no unusual heating or EMI issues.
- Overload/thermistor trips isolate only the affected motor and generate the expected alarm.

4.2. Operation: Bringing More Motors Online—The Safe Way

Let's imagine a scenario of 10 motors in parallel branches to a single VFD:

- 10 identical motors, each with its own downstream overload + contactor
- 5 are running on the single VFD
- You want to **add the other 5**, then **restart all 10 together**—without abusing the drive or the motors

A) Prepare to stop the running 5

1. **Command normal stop (ramp-down)**

    - Use conservative deceleration so you don't pump the DC bus (no aggressive braking to ease the energy handling by the regenerative AFE).
    - Wait until the drive reports **Output Frequency ≈ 0 Hz** and **Motor Current ≈ 0** (or "stopped" status). The Clean Power VFD is then in "ready to run" status, announced by the R2 output relay (default setting)

2. **Positively de-energize the output before any contactor action**

    - **Disable the motor** by opening the contact on the digital input previously assigned to the external event. That guarantees "no power on the output" before touching the output contactors.
    - **Why this matters:** Closing or opening output contactors with power present can damage SiC MOSFETS and/or the motor. Start/stop must be done by the drive, not by toggling output contactors.
    - Use **Lockout/Tagout (LoTO)** on this actuator when performing the sequence. This provides a positive, human-controlled means to **stop** and **hold** the VFD output **inhibited** while you close the added contactors, and to **re-enable** only when ready.

3. **Confirm "output safe to switch"**

    - Conditions to check in logic: No run command, OutputEnabled = 0.
    - Optional: add a small **safety timer** (e.g., 500–1000 ms) after the VFD's output is disabled before closing any contactor.

B) Add the 5 remaining motors (contactors)

4. **Close contactors only with the drive output inhibited**

    - Close **all five** remaining motor contactors, or one by one if your Standard Operating Procedure (SOP) requires, but **only** while the VFD output is disabled (Output Inhibit).
    - Use each contactor's **auxiliary feedback** contact to verify it actually closed.
    - Keep the original 5 contactors closed (they're already connected).

    Rule of thumb you must respect: **never switch VFD output contactors while the drive is producing Power.** Doing so is a misapplication and can spike the output stage.

C) Restart all 10 safely

5. **Choose the right start method (critical for multi-motor):**

   Option 1 — "Constant short time / short pre-magnetization" start (preferred for multi-motor)

   Option 2 — Standard starting with a brief pre-flux (OK if you're sure all 10 are fully stopped)

   - Configure the start mode that **magnetizes first**, then ramp up from 0 Hz.
   - Set a **magnetization time** long enough to pull any residual spin to zero (typical starting point ~3 s; extend up to ~10 s if needed). This method is specifically recommended for multiple motors because it avoids misleading averaged back-EMF signals across many shafts.
   - Use a short pre-magnetization (hundreds of ms), then a gentle ramp.
   - Keep **V/f (scalar)** control for multi-motor operation.

6. **Re-enable the drive output**

   - **Clear** the alarm (LoTO removed, DI restored), wait for **Ready**, then **Run** and ramp.
   - Drive executes the selected start method (constant-time) and then ramps up to the commanded speed.

7. **Verify and monitor**

   - Check **branch currents** on each of the 10 motors at low speed, mid-speed, and nominal—look for sharing within a reasonable band (e.g., ±10%).
   - Confirm **no overloads** are near trip and that thermal states are normal.
   - If you see a persistent imbalance, investigate cable length symmetry, terminations, and load difference

Why these features matter (and when to use them)

- **Disabled output**: ensures no torque is produced and the output stage is inhibited. It's the cleanest, certified way to guarantee "no Power" before you close contactors. S
- **Constant-time / pre-magnetization start**: briefly magnetizes the motors to **pull any free-spinning shafts to a stop**, then ramp up from zero—**more reliable for multi-motor groups.** Start with ~3 s magnetization; extend if coasting loads take longer to settle.

4.3. Using PLC to switch more motors onto a single VFD

Here is a minimal control logic to execute the previous scenario using a PLC to add a group of motors to an already connected group of motors.

Here's a concise, **step-by-step list** using the external alarm on DI6 to disable the motors.

Safe Group Expansion — (Stop → Disable motors → Close K6–K10 → Release → Run)

Goal: Add the remaining motors to an already-running group, then restart all together safely.

- **Issue the Add-Group command**
  Operator requests to add the remaining motors (command latched once via one-shot).
- **Command Stop (DI4)**
  Ramp the running motors to 0 Hz. Do not touch output contactors while the drive is active.
- **Confirm stopped**
  Wait until **R3 = Running = 0**, output frequency ≈ 0 Hz, and motor current ≈ 0. Delay timer ~1.0 s.
- **Inhibit the VFD output (DI6 = external alarm - Major)**
  Ensures no PWM/torque is present at the output before switching contactors. Delay timer ~0.5 s.
- **Close added motor contactors**
  Energize the contactors for the new motors (keep the original ones closed). Do not start the drive yet.
- **Verify all contactors are closed**
  Check each auxiliary feedback. If any auxiliary fails within the timeout (e.g., 10 s), declare a **sequence fault**, keep DI6 asserted, and alert the operator.
- **Release VFD output (DI6 off)**
  Remove Motor Disable to re-arm the drive power stage. Delay timer ~0.5 s.
- **Confirm Ready (R2 = Ready-to-Run = 1)**
  Ensure the drive reports to be ready before starting.
- **Start the group (DI3 = Run Forward)**
  Drive performs **pre-magnetization/constant-time start** (recommended for multi-motor arrays), then ramps to setpoint from **AI1 (speed reference)**.
- **Monitor and verify**
  Check branch currents for reasonable sharing (e.g., ±10%), confirm no overload warnings, and log values at low/mid/nominal speeds.
- **Return to normal operation**
  Sequence releases control; standard Start/Stop and speed commands resume.

Notes

- **Never** open/close output contactors while the VFD is producing Power.
- Prefer **V/f (scalar)** mode for multi-motor operation; enable **constant-time/pre-mag** start.
- Per-motor overloads remain mandatory; the VFD cannot protect individual motors.

Fault path (any step fails or R1 = Alarm):
Drop **Run (DI3)**, assert **Motor Disable (DI6)**, open added contactors, latch **Sequence Fault**, and require operator reset/diagnosis before retry.

Ladder logic

Tags

PLC → VFD
- VFD_RUN_FWD → VFD **DI3** (Run FWD)
- VFD_Stop_Motor → VFD **DI4** (Stop – ramp)
- MotorGroup_Disable → VFD **DI6** (Motor Disable via external alarm of severity major)
- Speed Hz → VFD **AI1** (Speed reference in Hz, not used in the described sequence)

VFD → PLC
- VFD_Alarm ← VFD **R1** (Alarm)
- VFD_Ready_to-Run ← VFD **R2** (Ready-to-Run)
- VFD_Running ← VFD **R3** (Running)

Motors / Contactors (6–10 are the "to add")
- O_K6..O_K10 (contactor coils)
- I_K6_Aux..I_K10_Aux (auxiliary "closed" feedback)

Operator / HMI
- Group_Start, Group_Stop (normal run/stop for the group)
- AddGroup (command to add the remaining 5)

Internal Bits & Timers
- Seq_Active, S1_Stop, S2_Disable, S3_Close, S4_Release, S5_Run, Seq_Fault
- T_StopDwell (TON, PT=1.0s), T_DisableDwell (TON, PT=0.5s), T_CloseTimeout (TON, PT=10s), T_PostCloseDwell (TON, PT=0.5s), T_PreRunDwell (TON, PT=0.5s)

VFD setup notes
- DI4 = **Stop (ramp)**, DI6 = **External alarm severity major (output inhibit/freewheel)**, DI3 = **Run Forward**.
- Ensure Interlock truly **inhibits the power output**; that's the barrier before switching the output contactors.

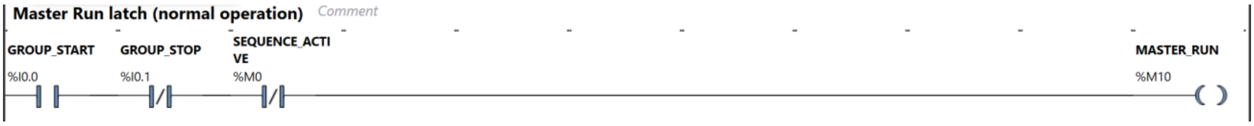
Ladder editor notes— read this before you copy-paste

This ladder is a **simple example** to illustrate a safe "Stop → Disable → Connect → Restart" sequence for adding motors in parallel on one VFD. **You must tailor it** to your real installation (hardware, I/O map, output inhibited, safety requirements, and commissioning procedures).

Editor/PLC specifics

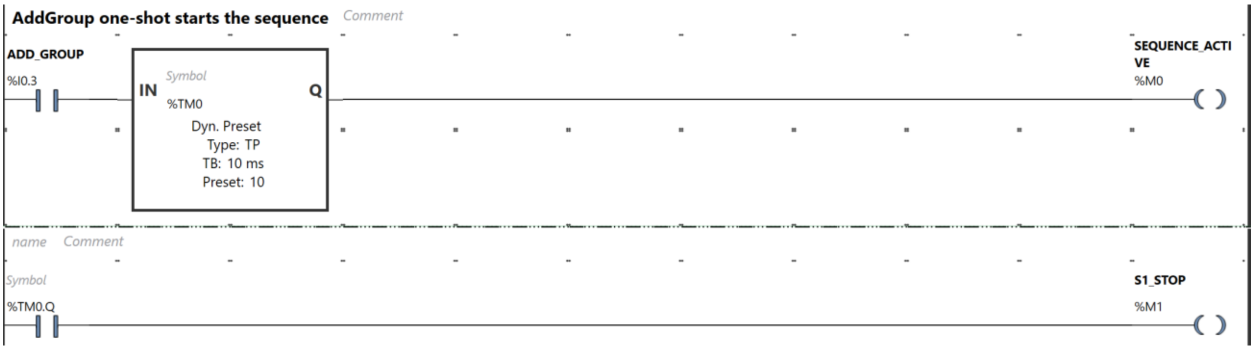
- Some ladder editors **forbid multiple coils on one rung** or **multiple writes to the same tag**; others allow it but behave **last-write-wins**. Check your IDE's rules. When in doubt, use a **single physical coil** per output and drive it via an internal command bit (e.g., `CMD_RUN → VFD_RUN_FWD`).
- Verify **scan order** and any **implied retentive behavior** (SET/RESET). Ensure step bits **can't overlap** on power-up or after a fault.

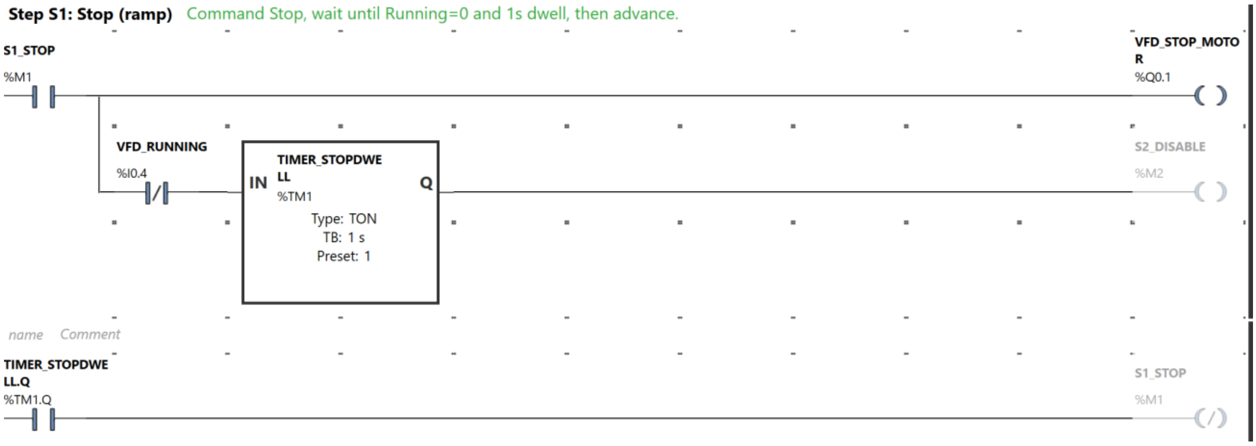
Master Run latch (normal operation)



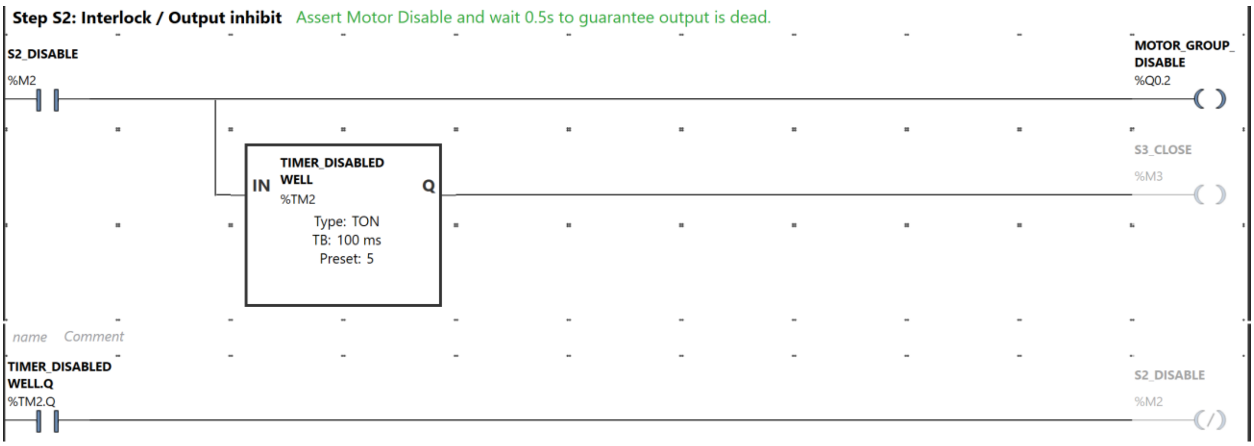
Execute motor run if Master is on, the VFD is ready, and the sequence to add more motors is not active

Initiate the sequence of adding more motors

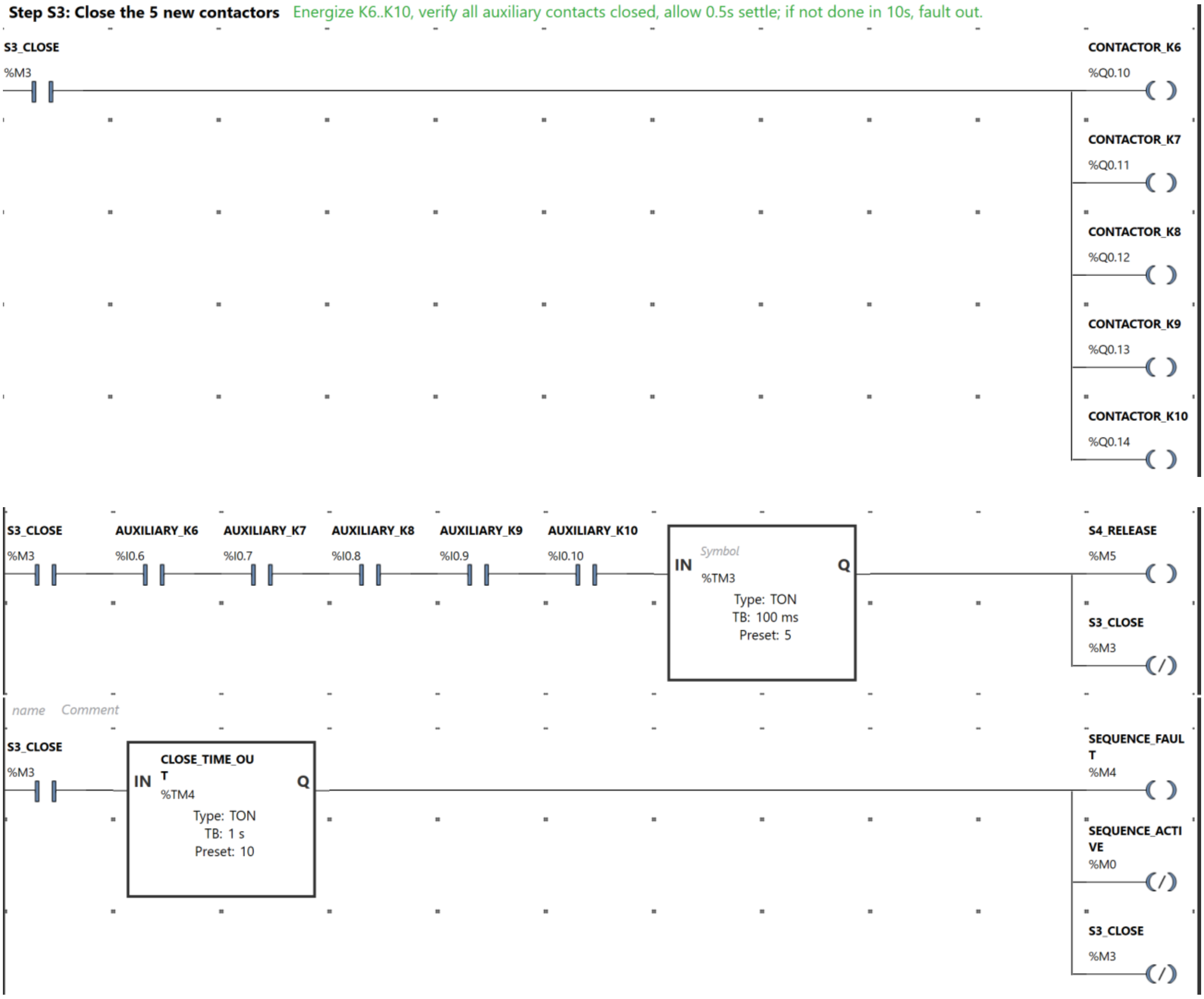




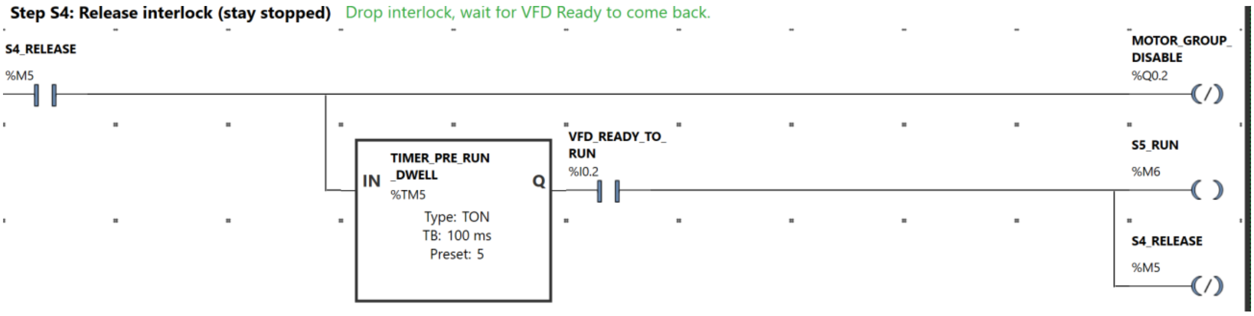
Disable the output of the VFD



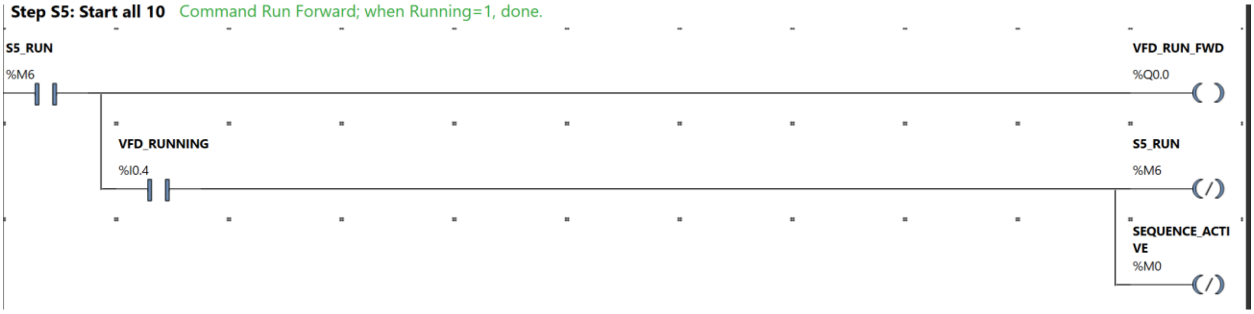
Close the contactors to add more motors



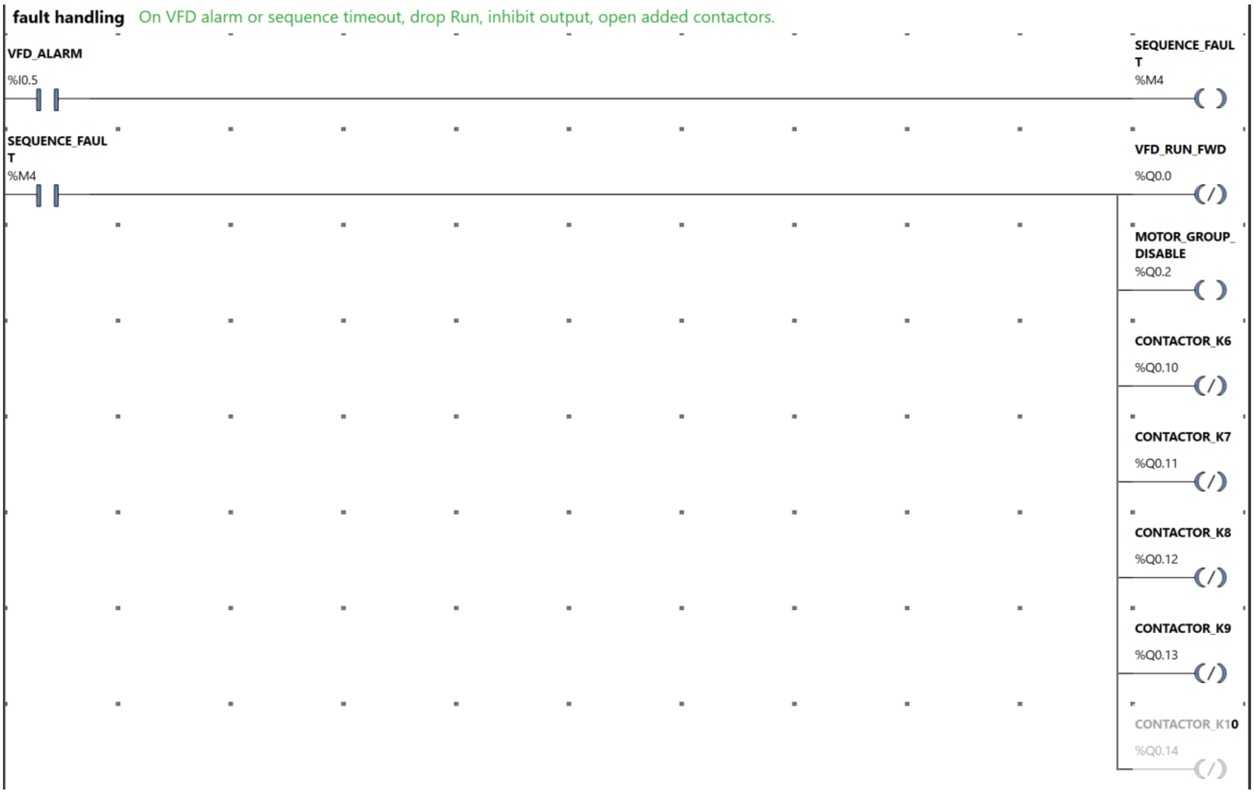
acknowledge the end of the sequence, release the motor control



Restart the whole group of motors and disable the sequence



Errors handling



Operator flow (what the tech does)

1. Press **AddGroup**.
2. Logic **stops** the 5 (ramp), **disables** VFD output, **closes** K6–K10, **re-enables** output, and **starts** all 10.
3. If any aux doesn't make in time or VFD alarms, the system **faults safely** and holds Motor Disable.

5. single point of failure

With **one VFD feeding several motors**, the **VFD becomes the single point whose failure stops all motors**.

Any issue that takes the drive out—fault trip, hardware failure, control-power loss, blown upstream fuse, comms loss to the PLC, halts the entire group. You gain simplicity and cost savings, but you trade away fault isolation.

Why it matters

- **All-or-nothing behavior:** One trip = all motors stop. There's no "keep the others running" option.
- **Availability math:** System availability is of that one drive chain (line power → VFD → outputs). With one drive per motor, a single failure only removes one motor (degraded performance, not total outage).
- **Downtime impact:** Mean time to repair (MTTR) for the VFD applies to the whole system. Spares and swap procedures matter.

When acceptance is reasonable

- The process **can safely stop** and restart without damage (e.g., non-critical ventilation, non-continuous pumping).
- **Cost, space, or simplicity** outweighs the risk of full-group stoppage.
- Operators can **tolerate a brief outage,** and you have a fast recovery plan (spare drive on site, parameter backup).
- Motors run at the **same speed profile** and don't need individual control.

When it's *not* reasonable

- **Life-safety or mission-critical** services (e.g., smoke control fans) that must run through faults.
- High **downtime cost** processes (continuous production lines, wastewater critical lifts without storage).
- Applications needing **independent control/protection** per motor.

Mitigation options (if you still want one drive)

- **Bypass path** (across-the-line) for a fixed-speed fallback if variable speed is temporarily non-essential.
- **Split the group** into two smaller groups with **two VFDs** (limit blast radius).
- Keep a **pre-programmed spare VFD** and quick-disconnect kit; store a current parameter file.
- **UPS** or buffered control power for the VFD control electronics and PLC I/O.
- **Condition monitoring & alarms** to catch trends before trips (overtemp, fan failure, DC bus anomalies).
- **Clear SOPs**: "If VFD trips → steps 1–5" with roles, tools, and acceptance criteria.

What to document (owner/AHJ sign-off)

- A short **risk statement**: "One VFD controls Motors M1–M4; any VFD outage stops all four."
- **Recovery plan**: spare on site, swap time target (e.g., <60 min), who performs it.
- **Operating limits**: when bypass is allowed, and what performance you lose.
- **Change control**: record of periodic tests, parameter backups, and firmware versions.

Bottom line: You're explicitly agreeing that the **entire group depends on one drive**. If that risk is tolerable *and* you have a fast, practiced recovery path, the architecture is justified. If not, use more than one VFD or add redundancy.

6. Benefits and results - Running Several Motors in Parallel on One VFD

What you get by using this method and the Clean Power VFD to run motors in parallel

- **Safe expansion without drama.**
  The **Stop → Disable → Connect → Restar**t sequence prevents switching contactors under Power.
  Result: fewer nuisance trips and no output-stage abuse when adding motors to the group.

- **Predictable restarts for big groups**
  Using **pre-magnetization/constant-time start** avoids false "catch" on mixed-speed shafts.
  Result: smoother current ramp, fewer overcurrent/overvoltage trips, and clean synchronization of all motors.

- **Filter-less efficiency**
  The Clean Power VFD's **sine-wave output** removes the need for external dv/dt or sine-wave filters, eliminating their insertion losses, heat, space, and maintenance.
  Result: lower panel heat and simpler BOM.

- **Better motor health and cable friendliness**
  True **low dv/dt** and low common-mode stress reduce turn-to-turn insulation stress, bearing distress, and cable charging issues—especially helpful with multiple drops.
  Result: longer motor/cable life and fewer bearing-related surprises.

- **Clean power, less interference**
  Ultra-low harmonics and a clean output mean less EMI/RFI grief across parallel runs and downstream controls.
  Result: fewer RCD/GFI nuisance trips and a quieter electrical environment.

- **Lower installed cost and footprint**
  One drive for a common-speed group cuts drives, breakers, heat, and wiring complexity (with the caveat that each motor still needs its **own overload**).
  Result: smaller panels, simpler commissioning, easier spares.

- **Operational simplicity**
  One speed reference (AI1) and one run/stop path for the whole array.
  Result: faster setup and fewer coordination errors when staging motors in or out.

- **Auditable safety behavior**
  Motor Disable provides a positive "no-output" condition before switching. Result: a sequence you can document, test, and sign off with your AHJ.

7. Conclusion

This application note has outlined the substantial benefits and enhanced performance capabilities provided by SmartD Technologies' Clean Power VFD.

By leveraging its advanced control algorithms and maintaining optimal motor function, the Clean Power VFD ensures superior efficiency, reliability, and sustainability in motor control applications.

We encourage industries looking to upgrade or install new motor control systems to consider the Clean Power VFD for its exceptional benefits.

For further information, and detailed specifications, or to initiate implementation in your operations, please visit our website: https://smartd.tech/ or contact us at +1-866-776-2783

Let SmartD help you achieve operational excellence with cleaner, more efficient power solutions.